A REVISION OF THE GENUS *PSEUDODINIA* COQUILLETT (DIPTERA: CHAMAEMYIIDAE)

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Abstract *Proc. ent. Soc. Ont.* 116:105-167 (1985)

The genus *Pseudodinia* Coquillett is revised. Two species groups are recognized, containing 17 species including 10 new species and one new name. The *P. polita* group contains *P. tuberculata* new species, *P. polita* Malloch, and *P. meridionalis* Hennig. The *P. varipes* group contains *P. cinerea* new species, *P. nigritarsis* new species, *P. slussi* new species, *P. varipes* Coquillett, *P. latiphallis* new species, *P. melanitida* new name (for *P. nitida* Melander), *P. occidentalis* new species, *P. pruinosa* Melander, *P. hamata* new species, *P. angustata* new species, *P. nitens* (Melander and Spuler), *P. angelica* new species, *P. obscura* new species, and *P. antennalis* Malloch.

Illustrations are provided of male genitalia for the 16 species for which males are known, and of other salient features of both sexes of adults and of the larvae. Scanning electron micrographs of features of adult and immature stages are included. Distribution maps are provided for all species. A phylogenetic analysis of 19 characters of the adults is presented.

All immature stages are described for *P. pruinosa* in southern Ontario where this species is associated with *Schyzachyrium scoparium* (Michaux) Nees (Gramineae: Andropogonaceae). The larvae feed on the mealybug *Trionymus winnemucae* McKenzie (Homoptera: Pseudococcidae) which lives within the leafsheaths of this grass. Another sympatric species of grass, *Andropogon gerardi* Vitman, supports populations of *P. antennalis* and *P. varipes* and another *Trionymus* species that infests that species of grass. *Pseudodinia melanitida*, which also occurs in southern Ontario, is not associated with either of these grasses.

Introduction

The family Chamaemyiidae is comprised of rather small flies often referred to as aphid-killing flies or silver flies. These descriptive names refer to the larval feeding habits and to the silvery grey vestiture of the adults, respectively. The number of described species in the family, on a worldwide basis, is only several hundred. These are divided among about 20 genera and subgenera, and representatives occur in every zoogeographic region. The vast majority of the species of the family belong to the genus *Leucopis* Meigen and its various subgenera. The genus *Pseudodinia* Coquillett, which is the subject of this study, is relatively small (17 species), and is restricted to the New World from Canada south to Costa Rica.

McAlpine (1963) redefined the family and classified it into two subfamilies, the Cremifaniinae containing only the genus *Cremifania* Czerny, and the Chamaemyiinae containing all the remaining genera [McAlpine 1960 (but see Steyskal 1971 and Griffiths 1972)]. The Chamaemyiinae is comprised of the two tribes, Chamaemyiini and Leucopini. The genus *Pseudodinia* belongs to the Chamaemyiini. Members of the Chamaemyiini are distinguished from those of the Leucopini by a relatively small, bare lunule, and more complete head chaetotaxy. As well, in the male there are two pairs of sternal and tergal elements between the fifth and ninth segments, compared to only one pair of sclerites in the same position in the members of the Leucopini.

Pseudodinia is unique among New World Chamaemyiidae in the frequent reduction of body pruinosity, leaving the frons and abdominal apex shiny black. Also, it is the only genus in the New World in which a solitary, well developed anepisternal seta is present. Dark, paired fasciae or spots on the abdominal tergites, which commonly occur elsewhere in the family, are absent in all species of *Pseudodinia*.

The literature dealing with *Pseudodinia* is restricted to the decriptive works listed by McAlpine (1965), the description of *P. meridionalis* Hennig (1941), and the lectotype designation for *P. polita* Malloch (Frison 1927). To date, there has been no definitive study

made on adults of the genus *Pseudodinia*, and no key to all the described species has yet been published. No life history or larval host associations have been previously documented for any of the species but Barber (1984) discusses some relationships and associations observed in Ontario. Sluss (1977) dealt with morphometric and electrophoretic characterization of some *Pseudodinia* populations in the southwestern United States. He implicated a *Muhlenbergia* species of grass as an associate of *Pseudodinia.*

Materials and Methods

Collections were made primarily in Ontario during the seasons of 1980-1984. The ethanol-preserved Malaise trap residues of several collectors also provided valuable specimens and information. Immature stages of *Pseudodinia* and pseudococcid hosts were obtained in Ontario, primarily through an artificial rearing system described by Barber (1984).

A total of about 3500 adult specimens of *Pseudodinia* were examined, the majority of which were obtained through loans from the institutions and curators listed below. Abbreviations, as indicated in brackets, are used in the text to show specimen deposition. American Museum of Natural History, New York, NY (AMNH), Dr. P. Wygodzinsky; Academy of Natural Sciences of Philadelphia, Philadelphia, PA (ANSP), Dr. D. Azuma; Biosystematics Research Institute, Ottawa, Ontario (BRI), Dr. J.F. McAlpine; Connecticut Agricultural Experiment Station, New Haven, CT (CTAS), K.A. Welch; California Academy of Sciences, San Francisco, CA (CAS), Dr. P.H. Arnaud, Jr.; Cornell University, Ithaca, NY (CUI), Dr. L.L. Pechuman; Institut für Pflanzenschutzforschung, Akademie der Landwirtschaftswissenschaften, Eberswalde, D.D.R. (DDRE), Dr. G. Morge; Field Museum of Natural History, Chicago, IL (FMNH), Dr. J.S. Ashe; University of Guelph, Guelph, Ontario (GUE), Dr. S.A. Marshall; Illinois Natural History Survey, Urbana, IL (INHS), Dr. D.W. Webb; Iowa State University, Ames, IA (ISU), Dr. R.E. Lewis; Natural History Museum of Los Angeles County, Los Angeles, CA (LACM), Dr. C.L. Hogue; Museum of Comparative Zoology, Harvard University, Cambridge, MA (MCZ), Dr. M.K. Thayer and Dr. N.E. Woodley; North Dakota State University, Fargo, ND (NDSU), Dr. E.U. Balsbaugh, Jr.; Kent State University, Kent, OH (OKSU), Dr. B.A. Foote; Oregon State University, Corvallis, OR (OSU), Dr. J.D. Lattin and J.D. Oswald; Frost Entomological Museum, Pennsylvania State University, University Park, PA (PSU), Dr. K.C. Kim and A.L. Norrbom; Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands (RNHL), Dr. P.J. van Helsdingen; University of Arizona, Tucson, AZ (UAT), Dr. F.G. Werner; University of California, Berkeley, CA (UCB), G.W. Ulrich; R.M. Bohart Museum of Entomology, University of California, Davis, CA (UCD), Dr. R.O. Schuster; University of California, Riverside, CA (UCR), Dr. S.I. Frommer; University of Idaho, Moscow, ID (UIM), F. Merickel; Snow Entomological Museum, University of Kansas, Lawrence, KS (UKL), Dr. G.W. Byers; Museum of Zoology, University of Michigan, Ann Arbor, MI (UMIC), M. O'Brien; University of Minnesota, St. Paul, MN (UMIN), Dr. P.J. Clausen; University of New Hampshire, Durham, NH (UNHD), Dr. D.S. Chandler; University of Nebraska State Museum, Lincoln, NE (UNL), Dr. B.C. Ratcliffe; United States National Museum, Washington, DC (USNM), Dr. B.V. Peterson and Dr. W.W. Wirth; Utah State University, Logan, UT (USU), Dr. W.J. Hanson; University of Wyoming, University Station, Laramie, WY (UWY), Dr. R.J. Lavigne; James Entomological Collection, Washington State University, Pullman, WA (WSUP), Dr. R.S. Zack.

Adult specimens preserved in 70% ethanol were processed by serial dehydration to 95% ethanol and then by critical point drying.

The terminology reference systems followed are those of McAlpine (1981) for adults, and Teskey (1981) for larvae, both in the recent Manual of the Nearctic Diptera [McAlpine *et al.* 1981 (but see Griffiths 1972)]. The majority of morphological terms used in the

following sections are illustrated in Figs. 1-65. One departure from McAlpine's terminology is that the setae anteroventral to the genal-occipital furrows and anterodorsal to the postgenal setae are referred to as genal setae. The term subvibrissal setae is not used.

Square brackets — "[ ]" — are used to insert additional data, or interpretations of existing data on specimen labels.

Measurements of bilateral structures were generally taken from one side only, usually the left side. The origins of the orbital setae were measured on both sides and averaged for each individual. A minimum of ten specimens of each sex were measured for each species where possible. Measurements are reported as ranges where possible but are not to be considered absolute. Several measurements require clarification. Height and length of the compound eye were measured from the anterolateral aspect in nearly a ¾ view to provide maximum planar exposure of each dimension. Genal width was measured as the minimum perpendicular distance from the subcranial margin to the compound eye when viewed from slightly below to maximize the planar exposure of this area. Length of flagellomere 1 was measured as the maximum distance form the base of the arista to the apex of flagellomere 1. Widths of wing cells r_1 and r_{2+3} were measured at the level of crossvein dm-cu, perpendicular to vein R_{2+3}. Width of cell r_1 included the entire width of the costal vein while midpoints of veins R_{2+3} and R_{4+5} were used.

Adult Morphology and Taxonomic Characters

Morphological conservatism predominates in *Pseudodinia.* Colour and details of the male terminalia are the characters of most taxonomic value, and are discussed below. For a detailed discussion of the morphology of *Pseudodinia*, see Barber (1984).

Colour. This is the most obviously variable character when comparing species of *Pseudodinia* but it is difficult to use exclusively. The predominant ground colour of the cuticle is black (excluding the wing, calypteres, and halter), with yellow sometimes occuring on the antenna and palp, and always on the fleshy parts of the proboscis and on parts of the legs. Any grey appearance is the product of reclinate microtrichia or pruinosity with the density and angle of view determining the intensity of grey colouration. There are no notal vittae and no abdominal fasciae or spots in species of *Pseudodinia.*

The principal areas where pruinosity is taxonomically significant are the frons, abdominal tergites, gena, parafacial, and notum.

Male terminalia. Tergite 6 is divided medially (Fig. 10) except in members of the *polita* group (Fig. 8; male of *P. tuberculata* new species not known), and *P. cinerea* new species (Fig. 9) and *P. nigritarsis* new species of the *varipes* group. One specimen each of *P. varipes* Coquillett and *P. occidentalis* new species, have a complete and partially divided tergite 6, respectively, suggesting that unless these specimens are misidentified, tergite 6 can vary intraspecifically.

The lengths of the tergite 6 and syntergosternite 7+8, relative to tergite 5, are useful only in the extremes where, for example, syntergosternite 7+8 is 0.2-0.3 times the length of tergite 5 in members of the *polita* group, 0.3 times in *P. angelica* new species and *P. nigritarsis,* and 0.4 times or 0.4-0.5 times in all other species of the *varipes* group.

Sternites 6 and 7 provide some useful differences in the degree to which a strap-like sclerite is present on the left side. This is best developed in the *polita* group where it runs from the left sensory setula of sternite 6 to the left sensory setula of sternite 7, encircles spiracle 7, and continues completely across the dorsum as a narrow sclerotized rim on the basal margin of syntergosternite 7+8 (Fig. 8). This sclerite is variable developed in the *varipes* group but never extends beyond spiracle 7 (Fig. 9). The predominant condition has two separate sclerotized patches, one on the anterolateral margin of each of sternites 6 and 7 (Fig. 10).

The lateral profile of the epandrium, paramere, and aedeagus are extremely important. That of the gonopod is somewhat more variable and must be considered in combination with other characters. The relative lengths of the gonopod and paramere are useful in distinguishing *P. polita* (Fig. 13) from *P. meridionalis* (Fig. 14) and for recognizing *P.*

nigritarsis (Fig. 16), all three species having an elongate gonopod. The gonopod usually bears two or three setae (rarely one) in all species except the holotype of *P. nigritarsis* which has three or four. The pattern of setulae on the parameres is useful only in defining the two species groups. The shape of sternite 10 is useful in defining the *polita* group and *P. cinerea*. For details, reference to the descriptions of the species groups should be made.

Taxonomically, the aedeagus is perhaps the most important genitalic structure. Its relative length, curvature, and ventral outline have proved useful in recognizing some otherwise cryptic species such as *P. pruinosa* Melander and *P. latiphallis* new species. The curvature of the aedeagus and the degree to which a pair of preapical ventral keels is developed are useful in distinguishing sympatric populations of *P. varipes* (Fig. 21) and *P. pruinosa* (Fig. 26) in Ontario.

Female terminalia. Very little discriminatory information is provided by the female terminalia. The greatest morphological divergence exists between the two species groups and yet the female terminalia are very similar (Figs. 11-12). Tergite 6 is divided medially in the *varipes* group (Fig. 12) but is complete in the *polita* group (Fig. 11). The segments posterior to this are predominantly weakly sclerotized and their limits are not readily defined.

Pseudodinia Coquillett

Pseudodinia Coquillett, 1902: 187. Type-species *Pseudodinia varipes* Coquillett 1902: 187 (original designation).

Pseudodinia; Melander 1913: 295; Malloch 1915: 151; Malloch 1921: 347; Frison 1927: 196; Curran 1934: 365; Malloch 1940: 268; Hennig 1941: 63; McAlpine 1960: 53; McAlpine 1965: 708.

Diagnosis. [for a detailed description see Barber (1984)]. Chamaemyiini with the following characteristics. Small flies of about 2-4 mm. in length. Colour ranging from sparsely pruinose or shining black, to densely pruinose or dull grey; apical abdominal tergites usually bare especially in females. No mesonotal vittae and no contrasting black spots or fasciae on abdomen. Usually some yellow on tarsi, tibiae, and knees, and occasionally on palp and antenna. Calypteres and halter white to yellow. Wing hyaline to lightly infuscate. Flagellomere 1 subovate, rarely with an anterodorsal angle. Two reclinate orbital setae, 0+2 dorsocentral setae, and one anepisternal seta present. Paramere with medially bevelled apex bearing one outstanding preapical setula on medioventral surface.

KEY TO THE SPECIES OF *PSEUDODINIA*

(Species descriptions are arranged in the order in which they appear in the key.)

1. Lower orbital seta arising at or behind 0.4 (usually 0.2 or less) of frontal length (Figs. 1-2, 42). Orbits with a complete series of erect to reclinate setulae; these often longer anteriorly, especially in males. Erect setulae sparsely scattered over most of frons; these weaker than ocellar setulae. Anepisternal seta arising at or above 0.6 of anepisternal height (Fig. 4b). Cell r_{2+3} 1.2-1.5X width of cell r_1 at level of crossvein dm-cu (Fig. 6). Tibiae entirely yellow ..... *polita* group 2

— Lower orbital seta arising at or anterior to 0.4 (usually 0.5-0.6) of frontal length (Fig. 3, 44). Orbits with only short proclinate and a few reclinate setulae in anterior half. About 25-30 proclinate setulae on anterior half of frons; these subequal to ocellar setulae. Anepisternal seta arising at 0.5 of anepisternal height (Fig. 5b). Cell r_{2+3} 0.8-1.1X width of cell r_1 at level of crossvein dm-cu (Fig. 7). Tibiae with at least basal third darkened ..... *varipes* group 4

2. Lower orbital seta arising at about 0.4 of frontal length (Fig. 1). Median tuberculate prominence present on lower margin of face. Southern Mexico .... *tuberculata* new species

— Lower orbital seta arising at or behind 0.2 of frontal length (Figs. 2, 42). Facial

prominence not developed 3

3. Orbital setae usually reduced (Figs. 2, 42); upper orbital seta 0.3-0.7X length of inner vertical seta, subequal to or shorter than postocellar seta; lower orbital seta even shorter, often barely distinguishable from adjacent setulae. Male genitalia as in Figs. 13, 43; epandrium relatively elongate distal to condyle; paramere at least 3.0X length of gonopod; tip of aedeagus gradually tapering in ventral view, with low median carina on swollen ventral surface. Eastern North America w. to Nebraska ..... *polita* Malloch
— Orbital setae usually longer; upper orbital seta 0.5-0.6X length of inner vertical seta, distinctly longer than postocellar seta; lower orbital seta slightly shorter than, or subequal to, upper orbital seta. Male genitalia as in Fig. 14; epandrium more quadrate; paramere shorter, at most 2.5X length of gonopod; aedeagus abruptly narrowed preapically in ventral view, terminating in a truncate tip, apicoventral surface swollen but lacking median carina. Southern Mexico; Costa Rica ... *meridionalis* Hennig

4. Frons entirely pruinose grey 5
— Frons bare, shiny black on at least anterior 0.5 10

5. Antenna and palp entirely dark brown to black 6
— Antenna with at least scape, pedicel, and basal 0.3 of flagellomere 1 paler, usually yellow (rarely brown in *P. antennalis*). Palp entirely yellow 8

6. Densely pruinose grey species. Abdomen entirely pruinose in both sexes. Tergite 6 of male complete (Fig. 9), not divided medially. Male genitalia as in Fig. 15; epandrium broadly triangular; paramere broadened apically; sternite 10 linear; aedeagus relatively narrow in ventral view. Colorado; central Mexico ..... *cinerea* new species
— Less densely pruinose species. Abdomen of male completely pruinose; of female with successively larger sublateral bare areas on tergites 3-5, leaving tergite 5 almost completely bare. Tergite 6 of male divided medially (Fig. 10). Male genitalia as in Figs. 31-32; epandrium strongly narrowed apically; paramere not broadened apically; sternite 10 quadrate to trapezoidal; aedeagus variable 7

7. Male genitalia as in Fig. 30; apex of aedeagus recurved dorsally forming an acute point, and with no preapical ventral raised area or keels. Tarsomeres 3-5 usually only slightly darkened to brown. Arizona; Colorado; New Mexico ..... *hamata* new species
— Male genitalia as in Fig. 31; apex of aedeagus truncate, and with ventral preapical median area slightly raised with keels poorly defined. Tarsomeres 2-5 or 3-5 usually darkened to brown or black. Arizona; New Mexico; central Mexico ..... *angustata* new species

8. Tarsomeres 2-5 gradually darkening to dark brown or black apically. Male genitalia as in Fig. 33; aedeagus nearly parallel-sided on apical half, with apical emargination well developed, and with preapical keels poorly defined, but median trough well developed. California ..... *angelica* new species
— Tarsi entirely yellow. Male genitalia as in Figs. 34-37; aedeagus more bulbous on apical half, apical emargination lacking or poorly developed, and with preapical ventral keels poorly developed and median trough variable 9

9. Wing membrane distinctly infuscated in male (female not known). Male genitalia as in Fig. 37; epandrium relatively long and narrow; aedeagus widely truncate apically, and with median trough very well developed. Southern Mexico .. *obscura* new species
— Wing membrane hyaline. Male genitalia as in Figs. 34-36; epandrium relatively short and broad; aedeagus more rounded apically, and with median trough very poorly developed. Eastern North America to Manitoba; Arizona; New Mexico; central Mexico ..... *antennalis* Malloch

10. Tarsi entirely black; legs black except narrowly yellow on knee of foreleg, and on apical 0.4 of all tibiae. Male genitalia as in Fig. 16; gonopod narrow and elongate; preapical ventral surface of aedeagus with median trough poorly defined, and with keels poorly developed, but noticeably higher basally. Santa Cruz Island, California ..... *nigritarsis* new species
— At least tarsomere 1 yellow; legs black to pruinose grey with variable extent of yellow on knees and tibiae. Male genitalia as in Figs. 17-29, 32, 45; gonopod shorter; preapical ventral surface of aedeagus variable 11

11. Abdomen of male with pruinosity extending broadly across full length of tergites 1-4; sublateral bare areas sometimes present on tergite 4 and with tergite 5 dorsally bare, or entire abdomen lightly pruinose. Abdomen of female with sublateral bare areas present on tergites 3 and 4 and with tergite 5 bare dorsally; pruinosity on tergite 4 extending full length at least as a narrow median strip of scattered microtrichia. Vertex and ocellar triangle distinctly pruinose. Male genitalia as in Fig. 32; epandrium strongly narrowed, apices nearly parallel-sided, in lateral view; apex of aedeagus truncate, in ventral view, and with preapical area slightly raised with slight median depression. Washington; Wisconsin; Wyoming to Arizona and New Mexico .... *nitens* (Melander and Spuler)
— Abdomen of male with pruinosity extending broadly across tergites 1-3 and narrowly across tergite 4; tergite 5 entirely bare; tergites 2-4 with successively larger sublateral bare areas, leaving tergite 4 predominantly bare. Abdomen of female with pruinosity on tergite 4 somewhat less extensive than in male; if median strip reaches apex of tergite 4, then vertex and ocellar triangle bare. Male genitalia as in Figs. 17-29, 45; epandrium broader, more gradually tapered or abruptly narrowed preapically (Fig. 18); apex of aedeagus variable 12

12. Ocellar seta usually reduced, 0.6-0.7X length of upper orbital seta. Male genitalia as in Fig. 22; epandrium broad, in lateral view, with apices curved posteriorly; aedeagus heavily sclerotized, usually gradually curved in lateral view, apex broadly rounded in ventral view, and with preapical keels well developed. Arizona; central Mexico ... . *latiphallis* new species
— Ocellar seta usually longer, 0.7-1.1X length of upper orbital seta. Male genitalia as in Figs. 17-18, 20-29, 45; epandrium more elongate, in lateral view, apices not curved posteriorly; aedeagus less sclerotized, with curvature, apex, and keels variable 13

13. Strap-like sclerite on left side of sternites 6 and 7 of male, a single uninterrupted piece, bearing both left sensory setulae and encircling spiracle 7 (as in Fig. 9). Male genitalia as in Fig. 17; paramere nearly straight on medial surface, in ventral view; apex of aedeagus with ventral area raised, but with only an indistinct median depression. Arizona; New Mexico ..... *slussi* new species
— Strap-like sclerite represented at most by two discrete, often indistinctly sclerotized, anterolateral areas on left side of sternites 6 and 7 (Fig. 10); that of sternite 7 often continuing to encircle spiracle 7. Male genitalia as in Figs. 18, 20-29, 45; paramere sinuate on medial surface, in ventral view; apicoventral surface of aedeagus usually with moderately to well developed median trough and preapical keels 14

14. Male genitalia as in Fig. 18; epandrium abruptly narrowed preapically, medially curved; aedeagus with preapical keels and median trough, well developed, and with rounded apex, in ventral view. Thorax usually only lightly pruinose to shiny. Eastern Quebec to Yukon, s. to Indiana and Colorado ..... *melanitida* new name
— Male genitalia as in Figs. 20-29, 45; epandrium with apices broader, or if acute, then gradually narrowed, not medially curved; aedeagus variable. Thorax often more densely pruinose 15

15. Male genitalia as in Figs. 19-21; aedeagus gradually curved in lateral view with apex

rounded in ventral view, and with preapical keels usually well developed. Western specimens usually with short paramere, elongate gonopod, and anterodorsally angular flagellomere 1 (Fig. 20). British Columbia s. to California, Nevada, and New Mexico; Ontario ..... *varipes* Coquillett

— Male genitalia as in Figs. 23-29, 45; aedeagus with more abrupt angulation at about basal 0.3, with apex usually more truncate in ventral view, and with preapical keels variably developed 16

16. Male genitalia as in Figs. 23-24; aedeagus usually with widely truncate apex and deep median trough. Vertex and ocellar triangle bare. Thorax shiny; anterior acrostichal setulae usually extending anterior to level of postpronotal seta and subequal in strength to following acrostichals. British Columbia s. to California and New Mexico ..... *occidentalis* new species

— Male genitalia as in Figs. 25-29, 45; aedeagus usually with narrower apex, but if as widely truncate, then median trough not as deep and ocellar triangle and thorax very pruinose. If ocellar triangle and vertex completely bare and thorax lightly pruinose, then anterior acrostichal setulae usually not extending anterior to level of postpronotal seta, but if so, then weaker than following acrostichals. Widespread; Ontario to British Columbia, s. to Tennessee and southern Mexico ..... *pruinosa* Melander

The *Pseudodinia polita* Group

This group contains three species, *P. tuberculata, P. polita,* and *P. meridionalis*. They form a cluster of closely related species which together constitute the sister group of the remainder of the genus which is treated as the *varipes* group (Fig. 72).

Description (see key for diagnosis). Body length 1.8-3.1 mm. Predominantly shiny black with reduced pruinosity. Frons bare, shiny black, rarely with thin pruinosity (occasional specimens of *P. polita*). Antenna brown to black, often basally paler. Trochanters, tibiae, tarsi, and tips of femora yellow. Wing distinctly infuscated. Abdomen with dorsal wedge of pruinosity extending broadly across basal half of tergite 2 to basal third of tergite 3 leaving sublateral bare areas; remainder shiny black to apex of tergite 5.

Head (Figs. 1-2). Height of compound eye 1.1-1.2X length, 6.4-10.0X genal width. Genal width 0.4-0.7X height of flagellomere 1. Lower margin of face projecting abruptly, rarely produced into median swelling. Frontal width 0.8-1.2X length. Upper orbital seta arising from slightly posterior to level of median ocellus to about 0.1 of frontal length. Lower orbital seta usually arising at 0.1-0.2 (0.4 in *P. tuberculata*) of frontal length. Orbits also with complete series of erect to reclinate setulae; setulae often longer anteriorly, especially in males. Frons with weaker, erect to reclinate setulae sparsely scattered over most of surface; setulae weaker than ocellar setulae. Ocellar setulae in two or three pairs. Length of flagellomere 1 0.8-1.0X height; anterodorsally rounded.

Thorax (Fig. 4). Acrostichal setulae denser than in *varipes* group. Anepisternal seta arising at 0.6-0.8 of anepisternal height. Wing cell r_{2+3} 1.2-1.5X width of cell r_1 at level of crossvein dm-cu (Fig. 6).

Abdomen. Tergal and sternal setae more dense (Fig. 8) than in *varipes* group.

Male terminalia (Fig. 8; male of *P. tuberculata* not known). Tergite 6 complete, not divided medially, length 0.2-0.3X tergite 5; syntergosternite 7+8 0.2-0.3X length of tergite 5. Strap-like sclerite on left side extending posterodorsally from left sensory setula of sternite 6 to include sensory setula of sternite 7, encircling spiracle 7 and continuing completely across dorsum as narrow sclerotized band fused to anterior margin of syntergosternite 7+8. Genitalia as in Figs. 13-14, 43. Epandrium broadly oval, in lateral view, without strong anteroventral emargination; condyle developed into hook. Paramere and gonopod elongate; paramere 2.2-3.0X gonopod length. Paramere with scattered setulae, and with a cluster of setulae extending short distance basoventrally from level of outstanding preapical setula. Gonopod bearing two or three setae. Aedeagus elongate, basally curved through much more than 90°; preapical ventral area swollen, lacking median

trough (medially carinate in *P. polita*). Sternite 10 quadrate, slightly emarginate basally; condyles relatively long.

Female terminalia (Fig. 11). Tergite 6 complete, not divided medially, about 0.6X length of tergite 5.

Pseudodinia tuberculata new species

Figs. 1, 66.

Description. Holotype female (male not known). Body length 2.6 mm. Colour as in *P. polita* except as follows. Antenna and palp entirely black. No evidence of frontal pruinosity. Abdomen with dorsal wedge of pruinosity extending broadly onto basal third of tergite 3.

Head (Fig. 1). Height 1.3X length; width 1.8X length. Height of compound eye 1.1X length, 6.4X genal width. Frontal width 1.0X length. Orbital setae strong; upper orbital seta 0.8X length of inner vertical seta, arising slightly anterior to level of median ocellus; lower orbital seta 0.8X length of upper orbital seta, arising at about 0.4 of frontal length. Ocellar seta 0.6X length of upper orbital seta. Two pairs of ocellar setulae present. Gena with five or six setae. Length or flagellomere 1 0.8X height. Lower margin of face with a protruding medial prominence (Fig. 1).

Thorax. Anepisternal seta arising at 0.6 of anepisternal height. Katepisternum with one setula anterior to posterodorsal seta. Anterior acrostichal setulae extending anterior to level of postpronotal seta, but weaker than following acrostichals.

Type material examined. *Holotype* ♀ . MEXICO. Chiapas: San Cristobal [de las Casas], 7000′, 22.v.1969, H.J. Teskey (BRI).

Remarks. This species can be separated from the other two members of this species group by the more anteriorly placed orbital setae and the obviously bulbous swelling on the lower medial margin of the face.

Tergite 6 of the intact female holotype can be seen to be complete, not divided medially. This is consistent with other external characters of the *polita* group, and the unknown male is expected to have similarly consistent external and internal characters.

Distribution (Fig. 66). *Pseudodinia tuberculata* is known only from the type locality in Chiapas, Mexico.

Biology. The holotype was taken in the same locality, but not on the same day, as three specimens of *P. meridionalis*. No specific data are known.

Etymology. From the Latin *tuber* meaning "swelling", the specific epithet *tuberculata* refers to the median swelling on the lower margin of the face.

Pseudodinia polita Malloch

Figs. 2, 4, 6, 8, 11, 13, 42-43, 66.

Pseudodinia polita Malloch, 1915: 152.
Pseudodinia polita; Malloch 1921: 347; Frison 1927: 196 (lectotype designation); Curran 1934: 365; Malloch 1940: 268; Hennig 1941: 64; McAlpine 1965: 708.

Description. Body length 1.8-3.1 mm. Body generally with reduced pruinosity, appearing shiny black. Surface of frons bare, shiny black, rarely with obscure pruinose appearance anteriorly. Parafacial, gena, and face pruinose; face shinier medioventrally. Antenna usually brown, rarely black; scape, pedicel, and arista usually paler than flagellomere 1. Palp brown to black. Thoracic pruinosity light, heaviest along notopleural suture. Legs as for species group. Wing usually infuscate, rarely hyaline. Abdomen of male with dorsal wedge of pruinosity usually extending across basal 0.5-0.8 of tergite 2; at most, pruinosity extending to posterior margin of tergite 2 with basomedial patch on tergite 3, leaving tergite 2 with extensive sublateral bare areas, and tergites 3-5 predominantly to entirely bare. Of female, with pruinosity slightly less extensive.

Head (Figs. 2, 42). Height 1.2-1.5X length; width 1.7-2.0X length. Height of compound eye 1.1-1.2X length, 6.6-10.0X genal width. Frontal width 0.8-1.2X length. Orbital setae reduced, arising on posterior 0.2 of frons; upper orbital seta 0.3-0.7X length of inner vertical seta, arising from slightly posterior to slightly anterior to level of median ocellus in male, in female arising to about 0.1 of frontal length; lower orbital seta even shorter, often difficult to distinguish from adjacent orbital setulae, arising at 0.1-0.2 of frontal length. Orbital setulae usually increasing in length anteriorly, particularly in male. Ocellar seta 1.0-1.5X length of upper orbital seta. Ocellar setulae in two or three pairs. Gena with 5-10 setae. Length of flagellomere 1 0.8-1.0X height.

Thorax (Figs. 4, 6). Anepisternal seta arising at 0.7-0.8 of anepisternal height. Katepisternum with 1-3 setulae anterior to posterodorsal seta. Anterior acrostichal setulae often extending anterior to level of postpronotal seta but weaker than following acrostichals.

Male terminalia (Fig. 8). Tergite 6 0.2-0.3X length of tergite 5; syntergosternite 7+8 0.2-0.3X length of tergite 5. Genitalia as in Figs. 13, 43. Epandrium relatively elongate-oval, somewhat tapered apical to the condyle. Paramere about 3.0X length of gonopod. Apex of aedeagus gradually tapering in ventral view; preapical ventral area broadly swollen, with a median carina.

Type material examined. *Lectotype* ♀ and *allolectotype* ♂ (neither dissected). U.S.A. **Illinois:** Centerville[?] (White Heath), 16.viii.1914, Sangamon River, (C.A. Hart and J.R. Malloch) (INHS). The lectotype is badly damaged, possibly by dermestids, and has apparently been remounted on the original point. It lacks the head and several legs. *Paralectotypes* (3 ♂, 3 ♀). U.S.A. **Illinois:** same data as lectotype, 1 ♀ (INHS), 1 ♂ (AMNH), 2 ♂ (USNM), 1 ♀ (BRI); Urbana, 30.viii.1914, dredge ditch [J.R. Malloch], 1 ♀ (INHS). Frison (1927) corrected the collection dates for the type material which were apparently reported incorrectly by Malloch (1915). All the type material has been seen and these corrections are confirmed above. However, the type locality of Centerville was apparently doubted by Frison since the Sangamon River is not nearby, and he inserted "White Heath", as well as the names of the collectors. All paralectotypes bear "paratype" labels.

Other material examined. (36♂, 28♀). CANADA. **Ontario:** Windsor, 11.viii.1976, S.A. Marshall, 1 ♂ (GUE). U.S.A. **District of Columbia:** [no locality], 11.vi.1926, J.M. Aldrich, 1 ♀ (USNM); Washington, [no date], A.L. Melander Collection, 1 ♂ (USNM). **Florida:** Torreya State Park, 28.iv.1952, O. Peck, 1 ♂ (BRI). **Georgia:** Tennessee River, 13.vii.1957, C.J. Durden, 1 ♂ (BRI); Rabun Co., Addie Branch, E. Fork Chattooga River, 2400′, 1.viii.1957, J.G. Chillcott, 1 ♂ (BRI); Rabun Co., Rabun Bald, 3000′, 14.vii.1957, J.G. Chillcott, 1 ♀ (BRI); Fanning Co., Margret [Margaret], 22.vii.1957, J.G. Chillcott, 1 ♀ (BRI). **Illinois:** Urbana, Brownfield Woods, 20.vi.1919, [no collector] 1 ♂ (INHS); Urbana, 9.viii.1920, J.R. Malloch, 1 ♀ (INHS); White Heath, 30.v.1915, [J.R. Malloch] 1 ♂ (INHS); DuPage Co., Argonne Nat. Lab., 1.vii.1972, leg. D. Pearson, 1 ♂ (FMNH); Springfield, 24.ix.1939, Mohr and Burks, 1 ♀ (INHS); Carbondale, 15.v.1910, [J.R. Malloch] 1 ♀ (INHS); Du Bois, 24.v.1917, [J.R. Malloch], 1 ♀, 10.v.1918, J.R. Malloch, 1 ♀ (INHS); Augerville, 6.vi.1915, [J.R. Malloch], 1 ♀ (INHS). **Indiana:** LaFayette, J.M. Aldrich, 14.vii.1915, 1 ♂, 9.vi.1916, 1 ♂, 4.vii.1916, 1 ♀, 5.viii.[?], 1 ♂, 21.vii.[?], A.L. Melander Collection, 1 ♂ (USNM); Parke Co., 4miW Rockville, Hajji Hollow, 12.vi.1975, leg. H.S. Dybas, Malaise trap, 1 ♀ (FMNH). **Kentucky:** Pineville, 28.viii.1940, B.D. Burks, 1 ♀ (INHS). **Maryland:** Montgomery Co., Rockville, G. Steyskal, 13.vi.1965, 1 ♀, 30.v.1969, 1 ♂ (USNM); Beltsville, 21.v.1922, J.R. Malloch, 1 ♂ (USNM); Jacksons Is., 30.vi.1914, R.C. Shannon, 1 ♀ (USNM); Hyattsville, 2.viii.1908, F. Knab, 1 ♀ (USNM); Plummers Is., R.C. Shannon, 14.v.1915, 1 ♂, 26.vi.1915, 2 ♂, 3.viii.1915, at light, 1 ♂ (USNM); Plummers Is., K.V. Krombein, 8.ix.1963, 1 ♂, 21.vii.1971, 1 ♂ (USNM); Glen Echo, J.R. Malloch, 23.vii.1921, 1 ♂, 8.viii.1921, 1 ♀, 18.vi.1922, 1 ♂, 25.vi.1922, 1 ♂, 10.vi.1923, 1 ♂, 1.vii.1923, 1 ♀ (USNM). **Michigan:** Midland Co., 21.vii.1952, R.R. Dreisbach, 1 ♂ (USNM); Ingham Co., 11.vii.1949, R. Namba, 1 ♂ (USNM). **Mississippi:** Lafayette Co., [?].vi.1934, F.M. Hull, 1 ♀ (BRI). **Missouri:** Boone Co., Columbia, F.D. Parker, Malaise trap, 17-31.viii.1968, 1 ♂, 4.ix.1968, 1 ♀, 20.v.1970, 1 ♀ (USNM); Lincoln Co., Cuivre River State Park, 26.viii.1961, J.L. Laffoon, 1 ♂ (ISU). **Nebraska:** Crete, 3.vii.1960, W.F. Rapp, 1 ♂ (UNL). **New Jersey:** Riverton, 6.vii.[?], C.W. Johnson, 1 ♀ (MCZ). **New York:** Rochester, 8.vii.1933, R.L. Post, 1 ♂ (USNM). **North Carolina:** Looking Glass Rock nr. Pisgah Forest, 2500′, 19.vii.1957, J.G.

Chillcott, 3 ♂ (BRI); Macon Co., Wayah Gap, 4100′, 29.vii.1957, J.G. Chillcott, 1 ♂ (BRI); Pisgah Forest, 12.viii.1957, W.R. Richards, 1 ♀ (BRI); Highlands, Whiteside Mt., 21.viii.1957, C.J. Durden, 1 ♀ (BRI). **Virginia:** Fairfax Co., Dead Run, 29.viii.1915, R.C. Shannon, 1 ♂ (USNM); Glencarlyn, J.R. Malloch, 2.vi.1925, 1 ♀ , 11.vii.1925, 1 ♂ (USNM); Great Falls, [?].vi.1922, J.M. Aldrich Collection, 1 ♀ (USNM); Falls Church, 20.vi.[?], N. Banks Collection, 1 ♀ (MCZ); Bon Air, 16.viii.1936, [no collector], 1 ♀ (USNM). One additional male with only the following data: W.H., 11.viii.[?], A.H. Sturtevant Collection (USNM).

Remarks. This species can be distinguished from the two other members of this small species group by the relatively reduced orbital setae, paler antenna, details of the male genitalia (male of *P. tuberculata* not known), and its more northerly distribution.

Malloch (1915) described the frons of *P. polita* as "about twice as long as broad". This observation is misleading since measurements of four paralectotypes yielded a range of frontal length 1.0-1.1X width compared to measurements of 16 other specimens which gave a range of frontal length 0.8-1.2X width at the level of the median ocellus. He later illustrated the head of *P. polita* (Malloch 1921, P1.XLVI, Fig. 7), and in his key (p. 268) he referred to the frons as distinctly longer than wide. Measurements of his figure give a length near 1.2X the width. The possibility that he was including the vertex in his measurements may account for this discrepancy.

Curran (1934) remarked that one female paralectotype of *P. polita* "lacks the two strong frontals [orbital setae] and I would place it in *Paraleucopis* but it lacks the setulae on the underside of the costa". This remark was necessitated by his use of the presence or absence of "distinct" orbital setae to distinguish four genera of Chamaemyiini from *Leucopis* and *Paraleucopis*. The reduction of the orbital setae is best shown by *P. polita* and, to a lesser extent, by *P. meridionalis* and is also associated with a posterior placement on the orbital plates.

Variation. The broken female from Margaret, Georgia, might represent a new species but is provisionally treated under this name. The frons is obviously pruinose though somewhat dirty. The varation in the frontal vestiture of the males suggests that this could be only an extreme variant.

One female paralectotype has the anepisternal seta duplicated on the left side.

Distribution (Fig. 66). *Pseudodinia polita* is widely distributed in eastern North America. It is allopatric with respect to the other two species in this species group. The doubtful Centerville "type locality" (see above) is not included.

Biology. No specific biological information is available, but several of the collection labels above suggest riparian habitats. The complete tergite 6 of the female, a characteristic of this species group, suggests adaptation to oviposition in sites where the lateral compression of the terminalia is not required to the same degree as those of the *varipes* group, in which tergite 6 is divided in females of all members. Specimens of *Plunomia elegans* Curran have been collected from sedges growing in wetlands in Ontario and Manitoba and females of *Plunomia* species have a similarly complete female tergite 6. There is a possibility that this characteristic has arisen convergently in *Plunomia* and the *polita* group of *Pseudodinia*.

Some specimens of *P. antennalis* bear the same collection data as some specimens of *P. polita*, indicating that perhaps these two species can share a similar generalized habitat.

Pseudodinia meridionalis Hennig

Figs. 14, 66.

Pseudodinia meridionalis Hennig, 1947: 63.

Description. Body length 2.1-2.9 mm. Colour as in *P. polita* except antenna and palp usually black, sometimes narrowly brown basally.

Head. Height 1.3-1.5X length; width 1.8-2.0X length. Height of compound eye 1.1-1.2X length, 6.7-9.3X genal width. Frontal width 1.0-1.2X length. Upper orbital seta 0.5-0.6X length of inner vertical seta, arising at or slightly anterior to level of median

ocellus; lower orbital seta 0.7-1.0X length of upper orbital seta, arising at 0.2 of frontal length. Ocellar seta 0.9-1.2X length of upper orbital seta. Ocellar setulae in two or three pairs, the anterior pair sometimes nearly subequal to ocellar seta. Gena with 4-6 setae. Length of flagellomere 1 0.8-0.9X height.

Thorax. Anepisternal seta arising at 0.6-0.7 of anepisternal height. Katepisternum with one or two setulae anterior to posterodorsal seta. Anterior acrostichal setulae sometimes extending anterior to level of postpronotal seta, but weaker than following acrostichals.

Male terminalia. Tergite 6 0.2-0.3X length of tergite 5; syntergosternite 7+8 0.2-0.3X length of tergite 5. Genitalia as in Fig. 14. Epandrium less tapered than in *P. polita*. Paramere about 2.2X gonopod length. Aedeagus narrowing preapically in ventral view, apex rather truncate; preapical ventral area broadly raised but no median carina evident.

Type material examined. *Holotype* ♂ (dissected). COSTA RICA. **San José:** La Caja, 8kmW San José, [??].1930, leg. H. Schmidt (DDRE). Dr. Morge (at DDRE) has indicated that the microscope slide mount of the dissected abdomen is apparently lost. Two paratype males were dissected and examined. *Paratypes* (6 ♂, 2 ♀, and 1 lacking head and abdomen). Same data as holotype (DDRE). Hennig (1947) listed only 6 male and 1 female paratypes.

Other material examined (1♂, 2♀). MEXICO. **Chiapas:** San Cristobal de las Casas, 7087′, 28.vi.1969, B.V. Peterson, 1 ♂, 7000′, 20.v.1969, H.J. Teskey, 1 ♀, 7200′, 27.v.1969, W.R Mason, 1♀ (BRI).

Remarks. This species can be distinguished from *P. polita* by the usually longer orbitals and darker antenna, by details of the male genitalia, and by its more southerly distribution. The sympatric *P. tuberculata* has the orbitals displaced anteriorly, and the median margin of the face has a distinctive swelling.

Hennig (1947) described this species without having seen any other representative of the genus, working only from published descriptions. There are no published figures of the male genitalia of any *Pseudodinia* species except for that in his description of this species. Hennig's use of the "long frons" of *P. polita* (see "Remarks" under *P. polita*) to differentiate between these two species is confusing. *Pseudodinia meridionalis* specimens exhibit frontal dimensions wider than those of many *P. polita* specimens, but there is considerable overlap in these dimensions in the two species.

Variation. One paratype male has a low facial projection medially on the lower margin, similar to that of *P. tuberculata*, but much smaller. Other specific characters of the head, thorax, and genitalia hold true for this specimen.

The type material is dirty and abraded. Some of the relative lengths of the head setae might be underestimated since some of the setal sockets are large, and some of the setal stumps are thick.

Distribution (Fig. 66). *Pseudodinia meridionalis* is known from only one locality in Costa Rica and one locality in Mexico. This species is known to be sympatric with *P. tuberculata* and *P. obscura* but allopatric to its proposed sister species, *P. polita*.

The *Pseudodinia varipes* Group

This group contains all species of *Pseudodinia* that are not referrable to the *polita* group, a total of 14 species. Several of the included species may represent complexes of incipient or sibling species. These are discussed after the respective descriptions.

Description (see key for diagnosis). Body length 1.8-3.5 mm. Predominantly shiny black to densely grey pruinose. Antenna and palp usually black, sometimes basally pale, rarely nearly entirely yellow. Frons entirely pruinose or bare from anterior margin to at least level of upper orbital. Trochanters, femora (except knees), and at least basal third of tibiae, grey to black, matching general body colouration. Knees and apical 0.2-0.3 (sometimes 0.4-0.7)

of tibiae usually yellow. Tarsi yellow or darkened to brown or black, especially tarsomeres 3-5. Wing usually hyaline to slightly infuscate, rarely distinctly so (*P. obscura*). Abdomen of male with tergites 1-5 entirely pruinose or with successively larger sublateral bare areas on tergites 2-5, 3-5, or 4-5, narrowing the dorsal pruinosity in the form of a wedge and often leaving tergites 4-5 predominantly to entirely bare. Of female, with tergites 1-5 completely pruinose in *P. cinerea* only, otherwise with sublateral bare areas on tergites 2-5 or 3-5 leaving tergites 4 and 5 predominantly bare.

Head (Figs. 3, 44, 46). Height 1.0-1.5X length; width 1.5-2.1X height. Height of compound eye 0.8-1.1X length, 3.5-6.8X genal width. Genal width 0.6-1.0X height of flagellomere 1. Lower margin of face receding, not projecting abruptly. Frontal width 1.1-1.7X length. Upper orbital seta arising at 0.1-0.3 of frontal length. Lower orbital seta arising at 0.4-0.7 (usually 0.5-0.6) of frontal length. Orbits lacking complete series of reclinate setulae. Frons (including orbits) with transverse band of about 25-30 proclinate setulae extending from anterior margin to, or slightly posterior to, level of lower orbital seta; only a few of these setulae reclinate and restricted to level of lower orbital seta; setulae subequal in strength to ocellar setulae. Ocellar setulae in 1-3 pairs. Length of flagellomere 1 usually 0.8-1.0X height (Figs. 19c, 21c), often 1.1X in *P. varipes* (Fig. 20c); anterodorsal margin rounded, sometimes with variably developed angle (Fig. 20c).

Thorax (Fig. 5). Acrostichal setulae less dense than in *polita* group. Anepisternal seta arising at 0.5 of anepisternal height. Wing cell r_{2+3} 0.8-1.1X width of cell r_1 at level of crossvein dm-cu (Fig. 7).

Abdomen (Figs. 9-10). Tergal and sternal setae less dense than in *polita* group.

Male terminalia. Tergite 6 usually divided medially (Fig. 10), except in *P. cinerea* (Fig. 9) , *P. nigritarsis*, and one occurrence in each of *P. occidentalis* and *P. varipes*, 0.2-0.4X length of tergite 5; syntergosternite 7+8 0.3-0.5X length of tergite 5. Strap-like sclerite on left side of sternites 6 and 7 variably developed (Figs. 9-10), not extending beyond spiracle 7, never fusing with the posterior margin of syntergosternite 7+8; sometimes absent. Genitalia as in Figs. 15-37, 45. Epandrium never broadly oval, at most broadly triangular (*P. cinerea*, Fig. 15); usually anteroventrally emarginate producing tapered apices; condyle acute but never hooked. Paramere variable, usually considerably more than 4.0X gonopod length; with only scattered setulae, lacking distinct apical cluster of setulae of *polita* group. Gonopod usually poorly to moderately differentiated [exceptionally well developed in *P. nigritarsis* (Fig. 16) where paramere is only 2.8X gonopod]. Aedeagus relatively shorter and less angular basally than in *polita* group; preapical ventral area variable, usually with median depression or trough bordered by two keels. Sternite 10 usually quadrate to trapezoidal (linear in *P. cinerea*), variably emarginate basally; condyles relatively short.

Female terminalia (Fig. 12). Tergite 6 divided medially, 0.4-0.5X length of tergite 5.

Pseudodinia cinerea new species

Figs. 9, 15, 67.

Description. Body length 2.2-3.0 mm. Body entirely and densely grey pruinose except as follows. Antenna and palp black. Knees, tarsomere 1, and apical 0.0-0.3 of tibiae, yellow. Tarsomeres 2-5 gradually darkening to brown or black. Wing hyaline. Abdominal tergites 1-6 entirely pruinose in both sexes.

Head. Height 1.2-1.4X length; width 1.7-2.1X length. Height of compound eye 0.9-1.1X length, 3.5-4.1X genal width. Frontal width 1.4-1.7X length. Upper orbital seta 0.7-0.9X length of inner vertical seta, arising at 0.2-0.3 of frontal length in male, in female arising at 0.2-0.4 of frontal length. Lower orbital seta 0.6-0.7X length of upper orbital seta, arising at 0.6-0.7 of frontal length. Ocellar seta 0.8-1.0X length of upper orbital seta. Ocellar setulae in one or two pairs. Gena with 4-6 setae. Length of flagellomere 1 0.8-0.9X height, usually anterodorsally rounded, sometimes with slight angle preapically.

Thorax. Katepisternum with one or two setulae anterior to posterodorsal seta. Anterior acrostichal setulae sometimes extending anterior to level of postpronotal seta, but weaker than following acrostichals.

Male terminalia (Fig. 9). Tergite 6 complete, not divided medially, length 0.3-0.4X tergite 5; syntergosternite 7+8 0.4-0.5X length of tergite 5. Strap-like sclerite running uninterruptedly from left sensory setula of sternite 6 to that of sternite 7, and continuing posteriorly to encircle spiracle 7. Genitalia as in Fig. 15. Epandrium broadly triangular in profile, gradually tapering to a broad, blunt apex. Paramere with broad apex and sharp apical bevel. Gonopod evident only as low angulation, bearing two or three setae. Aedeagus narrow, apically emarginate in ventral view; preapical ventral keels well developed. Sternite 10 unusually wide and short. Vestige of tergite 10 relatively elongate, associated with reduced inner margin of epandrial apex.

Type material examined. *Holotype* ♂ (not dissected). MEXICO. **Durango:** 30miW Durango, 8000′, 6.v.1961, Howden and Martin (BRI). *Paratypes* (17♂, 21♀). U.S.A. **Colorado:** Teller Co., Florissant Fossil Beds, 8.viii.1973, D. Wilder and D.Shetlar, 2♂, 2♀ (GUE), 4♂, 4♀ (CAS), 2♂, 1♀ (PSU). MEXICO. **Durango:** same data as holotype, 6♂, 9♀ (BRI); 30miW Durango, 8000′, 6.vi.1964, J.F.McAlpine, 1♀ (BRI); 3miE El Salto, 8400′, 21.vi.1964, J.F.McAlpine, 2♂, 1♀ (BRI); 10miW El Salto, 9000′, 10.vi.1964, J.F.McAlpine, 1♀ (BRI); Navios, 26miE El Salto, 8000′, 27.vii.1964, J.F.McAlpine, 1♀ (BRI). **Mexico:** Atlacomulco, 8500′, 18.viii,1954, J.G.Chillcott, 1♂, 1♀ (BRI).

Remarks. This is a very distinctive, entirely and densely pruinose grey species. The males can be distinguished from those of all other species by a combination of their pruinose frons, dark antenna, and complete tergite 6. This is the only species where tergites 1-6 of the female abdomen are entirely pruinose. Additional characters of the male genitalia are diagnostic.

Distribution (Fig. 67). *Pseudodinia cinerea* is known from several localities in Mexico and one locality in Colorado. It is surprising that there still exists a large geographical gap between the records from Durango and Colorado when the extensive collections from Arizona and the distinctiveness of this species are considered.

Biology. This species has been collected with specimens of *P. pruinosa* and *P. nitens* in Colorado, and *P. latiphallis, P. angustata,* and *P. pruinosa* in Mexico. No specific biological data are known.

Etymology. From the Latin *cinereus* meaning "ash-coloured or grey", the specific epithet *cinerea* refers to the extreme density and extent of grey pruinosity of this species.

Pseudodinia hamata new species

Figs. 30, 70.

Description. Body length 2.1-2.8 mm. Predominantly grey pruinose though not as intensely as *P. cinerea.* Antenna and palp entirely dark brown to black, scape and pedicel sometimes slightly paler. Thorax and legs dark grey pruinose except knees, tarsomere 1, and apical 0.2-.03 of tibiae yellow; tarsomeres 2-5 gradually darkening to dark brown at least dorsally. Wing hyaline. Abdomen of male with tergites 1-5 entirely pruinose. Of female, with dorsal wedge of pruinosity extending narrowly to broadly across tergite 4, and sometimes as a narrow medial strip onto basal half of tergite 5, rarely extending its full length; sublateral bare areas on tergites 3-5 leaving tergite 4 predominantly, and tergite 5 almost entirely, bare.

Head. Height 1.2-1.5X length; width 1.7-2.0X length. Height of compound eye 1.0-1.1X length, 4.1-6.3X genal width. Frontal width 1.3-1.6X length. Upper orbital seta 0.8-1.0X length of inner vertical seta, arising at 0.1-0.2 of frontal length. Lower orbital seta 0.6-0.8X length of upper orbital seta, arising at 0.5-0.6 of frontal length. Ocellar setulae in 1-3 pairs. Gena with 4-7 setae. Length of flagellomere 1 0.8-0.9X height, anterodorsally rounded.

Thorax. Katepisternum with one or two setulae anterior to posterodorsal seta. Anterior acrostichal setulae sometimes extending anterior to level of postpronotal seta but

weaker than following acrostichals.

Male terminalia. Tergite 6 divided medially, length 0.3-0.4X tergite 5; syntergosternite 7+8 0.4-0.5X length of tergite 5. Sternites 6 and 7 with no trace of strap-like sclerite on left side. Genitalia as in Fig. 30. Epandrium narrow in apical half, often swollen posteriorly opposite ventral apex of cercus. Paramere of moderate length. Gonopod short, bearing two or three setae. Aedeagus abruptly narrowed into dorsally recurved, apical hook; no preapical ventral keels evident.

Type material examined. *Holotype* ♂ (not dissected). U.S.A. **New Mexico:** Catron Co., 8miSE Luna, 7500′, 9-14.vii.1979, S&J. Peck, pond. pine at stream [Malaise trap] (BRI). *Paratypes* (18♂, 13♀). U.S.A. **Arizona:** Apache Co., 16miS Big Lake, 4.ix.1973, T.P.Sluss, 3♂ (UAT), 3♂ (USNM), 1♂ (BRI); Apache Co., Alpine, Luna Lake, 7900′, 9-14.vii.1979, S&J. Peck, pine meadows [Malaise trap], 2♀ (GUE); Cochise Co., Chiricahua Mts., Barfoot Lookout, 8.vii.1973, T.P.Sluss, 2♂ (UAT); Graham Co., Pinaleno Mts., Heliograph Park, 15.vii.1972, T.P.Sluss, 1♂ (UAT), 1♂ (BRI); Graham Co., Pinaleno Mts., Hospital Flat, 15.vii.1972, T.P.Sluss, 1♂ (UAT); Graham Co., Pinaleno Mts., Goudy Creek, 9200′, 7.vii.1973, T.P.Sluss, 1♀ (UAT). **Colorado:** Saguache Co., Valley View Springs, about 7miE of Mineral Hot Springs, on W. foot of Sangre de Cristo range, about 8500′, 14.viii.1965, H.B.Leech, 1♂ (CAS). **New Mexico:** same data as holotype, 4♂, 6♀ (GUE); Socorro Co., S. Baldy Park, 10400′, 20miW Socorro, 28.vi-7.vii.1979, S&J. Peck, alpine meadow [Malaise trap], 1♀ (USNM); Cloudcroft, 16.vi.1902, [no collector], 1♂, 3♀ (ANSP).

Remarks. *Pseudodinia hamata* can be distinguished from all other species except *P. angustata* by the combination of its pruinose frons, dark antenna, divided tergite 6 of the male, and shiny apical tergites of the female abdomen. Details of the male genitalia, particularly the aedeagus, are required to confidently separate males of these two species.

The colouration of the tarsi (see key couplet 7) and the abdominal pruinosity of the females can assist in distinguishing these two species. The dorsal pruinosity of the female abdomen extends onto tergite 5 in *P. angustata* but rarely so in *P. hamata* where the sublateral bare areas on tergites 3-5 are larger. Some specimens of *P. hamata* have the scape and pedicel paler, but the pale area on flagellomere 1 is restricted to the basal 0.2, unlike *P. angelica, P. antennalis,* and *P. obscura,* where at least the basal 0.3 is yellow.

Distribution (Fig. 70). *Pseudodinia hamata* is known from several montane localities in the southwestern United States.

Biology. No specific data are known, although pine and pine meadow habitats are implicated by some collection data.

Etymology. From the Latin *hamatus* meaning "hooked", the specific epithet *hamata* refers to the distinctive apical hook on the aedeagus.

Pseudodinia angustata new species

Figs. 31, 70.

Description. Body length 2.1-2.9 mm. Colour as in *P. hamata* except as follows. Antenna never basally paler. Abdomen of female with dorsal wedge of pruinosity extending broadly across tergite 4 and narrowly to broadly across tergite 5, usually even onto tergite 6; sublateral bare areas present on tergites 3-5 leaving tergite 5 predominantly bare.

Head. Height 1.2-1.5X length; width 1.7-2.1X length. Height of compound eye 0.9-1.1X length, 4.0-4.9X genal width. Frontal width 1.3-1.6X length. Upper orbital seta 0.8-1.0X length of inner vertical seta, arising at 0.1-0.3 of frontal length. Lower orbital seta 0.5-0.7X length of upper orbital seta, arising at 0.5-0.6 of frontal length. Ocellar seta 0.8-1.1X length of upper orbital seta. Ocellar setulae in two or three pairs. Gena with 4-6 setae. Length of flagellomere 1 0.8-0.9X height, anterodorsally rounded.

Thorax. Katepisternum with one or two setulae anterior to posterodorsal seta.

Anterior acrostichal setulae sometimes extending anterior to level of postpronotal seta but weaker than following acrostichals.

Male terminalia. Tergite 6 divided medially, length 0.3-0.4X tergite 5; syntergosternite 7+8 0.4X length of tergite 5. Sternites 6 and 7 with no trace of strap-like sclerite on left side. Genitalia as in Fig. 31. Epandrium very narrow in apical half. Paramere of moderate length. Gonopod poorly developed, bearing two or three setae. Aedeagus with preapical ventral area raised with median depression poorly developed or lacking, and keels indistinct.

Type material examined. *Holotype* ♂ (not dissected). U.S.A. **Arizona:** Apache Co., 25miW Springerville, Greens Peak, 10100′, 10-13.vii.1979, S&J. Peck, forest-meadow Malaise trap (BRI). *Paratypes* (22♂, 7♀), U.S.A. **Arizona:** same data as holotype, 8♂, 2♀ (BRI), 4♂, 2♀ (GUE), 4♂, 1♀ (USNM), 2♂ (UAT). **New Mexico:** Lincoln Co., Sierra Blanca, 9700′ 10-26.vi.1979, S&JPeck, Malaise trap, spruce-fir along stream, 1♂, 1♀ (BRI). MEXICO. **Durango:** 30miW Durango, 6.v.1961, Howden & Martin, 2♂, 1♀ (BRI); 30miW Durango, 6.vi.1964, J.F.McAlpine, 1♂ (BRI).

Remarks. *Pseudodinia angustata* is externally similar only to *P. hamata.* Distinguishing characters of these two species are discussed in "Remarks" under *P. hamata. Pseudodinia angustata* is also very similar to *P. nitens* in details of the male genitalia, including the very narrow epandrium and the preapical ventral area of the aedeagus. The glabrous condition of the frons and more extensive bare areas on the apex of the abdomen of *P. nitens* allow for ready recognition.

Distribution (Fig. 70). *Pseudodinia angustata* is known from only four collections in montane areas of the southwestern Unites States and central Mexico.

Biology. The Durango specimens of Howden & Martin were taken with *P. cinerea, P. latiphallis,* and *P. pruinosa.* This is an example of the possibility of several species of *Pseudodinia* co-occurring, in a relatively small area. No specific data are known.

Etymology. From the Latin *angustus* meaning "narrow", the specific epithet *angustata* refers to the very narrow epandrial apices, a character shared only with *P. hamata* and *P. nitens.*

Pseudodinia angelica new species

Figs. 33, 71.

Description. Body length 3.2-3.5 mm. Predominantly grey pruinose except scape, pedicel, palp, knees, tarsomere 1, basal 0.3-0.5 of flagellomere 1, and apical 0.2-0.3 of tibiae yellow. Apical 0.5-0.7 of flagellomere 1 and tarsomeres 2-5 gradually darkening to brown or black. Wing hyaline. Abdomen of male with dorsal wedge of pruinosity extending completely across tergites 1-3 and broadly onto tergite 4, continuing across distal half of tergite 4 as a narrow medial strip; sublateral bare areas on tergites 2-4; tergite 5 completely bare dorsally. Of female, with pruinosity extending broadly across tergites 1-3 and sometimes narrowly onto basal half of tergite 4; sublateral bare areas larger, leaving tergite 4 predominantly and tergite 5 entirely bare.

Head. Height 1.0-1.2X length; width 1.8-2.0X length. Height of compound eye 0.8-0.9X length, 3.8-4.0X genal width. Frontal width 1.2-1.5X length. Upper orbital seta 0.9-1.0X length of inner vertical seta, arising at 0.1-0.2 of frontal length. Lower orbital seta 0.7-1.0X length of upper orbital seta, arising at 0.5-0.6 of frontal length. Ocellar seta 0.8-1.0X length of upper orbital seta. Ocellar setulae in one or two pairs. Gena with six or seven setae. Length of flagellomere 1 0.9-1.0X height, anterodorsally rounded.

Thorax. Katepisternum with two setulae anterior to posterodorsal seta. Anterior acrostichal setulae extending anterior to the level of postpronotal seta, subequal in strength to following acrostichals.

Male terminalia. Tergite 6 divided medially, length 0.2X tergite 5; syntergosternite 7+8

0.3X length of tergite 5. Strap-like sclerite represented by small sclerotized area on left side of sternite 7 only, running from left sensory setula to encircle spiracle 7. Genitalia as in Fig. 33. Epandrium relatively elongate with broadly rounded apices. Paramere moderately developed. Gonopod moderately developed, bearing three setae. Aedeagus gradually tapering in ventral view, with an emarginate truncate apex, shallow median trough, and moderately developed preapical keels.

Type material examined. *Holotype* ♂ (dissected). U.S.A. **California:** Los Angeles Co., Beverly Glen, 520616X [16.vi.1952?] [no collector] (USNM; courtesy of LACM). This specimen was poorly mounted on a minuten pin and the wings were fractured. After softening and removal of the abdomen, the specimen was reglued to the minuten and the apical half of one wing removed and glued to the base of the minuten. *Paratypes* (3♀). U.S.A. **California:** Los Angeles Co., Mandeville Cn., Sta. Monica Mts., 1.v.1952, [no collector], 1♀ (USNM); Mts. nr. Claremont, [no date], Baker, 1♀ (ANSP); Sta. Barbara Co., Sta. Cruz Is., Coches Prietos, 17.vi.1967, R.L.Brumley, 1♀ (BRI).

Remarks. *Pseudodinia angelica* can be distinguished from all other species by the combination of its pruinose frons, basally yellow flagellomere 1, and darkened tarsomeres 2-5.

Variation. Syntergosternite 7+8 of the holotype male has the setae arranged in two discrete dorsolateral patches with the medial third lacking setae. The significance of this condition is not clear. In virtually all other dissections in all species, there is a continuous band of setae present along the posterior half or more. In some series of *P. pruinosa,* there is a range from a complete to a medially narrowed band of setae.

The holotype also has the lower orbital seta duplicated on the left side and a supernumerary seta near the lateral base of the right paramere (Fig. 33b). The latter condition has been observed in some *P. antennalis* and *P. occidentalis.*

Distribution (Fig. 71). *Pseudodinia angelica* is known only from the mountains surrounding Los Angeles and from Santa Cruz Island.

Biology. This species may be sympatric with *P. occidentalis* on the continent, and with *P. nigritarsis* on Santa Cruz Island. No specific data are known.

Etymology. *Pseudodinia angelica* is named for its apparently restricted distribution surrounding Los Angeles. The Latin *angelus* meaning "angel", is also appropriate. The request for a loan of material from LACM was made in an effort to acquire more specimens of this species of which there were only three females. The arrival of the male, the only specimen of *Pseudodinia* at LACM, was a godsend.

Pseudodinia obscura new species

Figs. 37, 71.

Description (male only, female unknown). Body length 3.0-3.1 mm. Predominantly pruinose grey except scape, pedicel, knees, tarsi, basal half of flagellomere 1, apex of palp, and apical 0.3-0.4 of tibiae yellow. Apical half of flagellomere 1, and base of palp brown. Wing distinctly infuscate. Abdominal tergites entirely pruinose grey.

Head. Height 1.3X length; width 1.9X length. Height of compound eye 1.0X length, 4.5-4.7X genal width. Frontal width 1.4X length. Upper orbital seta 0.8-0.9X length of inner vertical seta, arising at 0.2 of frontal length. Lower orbital seta 0.7X length of upper orbital seta, arising at 0.5-0.6 of frontal length. Ocellar seta 0.9-1.0X length of upper orbital seta. Ocellar setulae in two or three pairs. Gena with 6-9 setae. Length of flagellomere 1 0.8-0.9X height, anterodorsally rounded.

Thorax. Katepisternum with two setulae anterior to posterodorsal seta. Anterior acrostichal setulae extending anterior to level of postpronotal seta but weaker than following acrostichals.

Male terminalia. Tergite 6 divided medially, length 0.3X tergite 5; syntergosternite 7+8

0.4X length of tergite 5. Strap-like sclerite represented by a separate sclerotized area on left anterolateral corner of each of sternites 6 and 7, bearing the left sensory setula; that of sternite 7 running posteriorly to encircle spiracle 7. Genitalia as in Fig. 37. Epandrium relatively elongate, gradually tapering. Paramere relatively broad apically, with ventral margin of bevel sharp. Gonopod moderately developed, bearing two or three setae. Aedeagus ventrally with very broad, emarginate apex; preapical keels moderately developed but median trough deep, providing most of the definition of median margin of keels.

Type material examined. *Holotype* ♂ (not dissected). MEXICO. **Chiapas:** 10miNE San Cristobal [de las Casas], 5.v.1969, 7500', H.J.Teskey (BRI). *Paratype* (1♂, dissected). Same data as holotype (BRI).

Remarks. *Pseudodinia obscura* can be distinguished from all other species except *P. antennalis* and *P. angelica* by the combination of its pruinose frons and basally yellow flagellomere 1. It can be distinguished from the latter two species by a distinctive infuscation of the wing and characters of the male genitalia. The deep trough of the aedeagus is matched only by some specimens of *P. occidentalis*. The infuscation of the wing, when viewed comparatively, is very distinctive. It is the relative nature of this character that determined its subordination to the tarsal colouration of *P. angelica* in the sequence of the key couplets. Both characters are known to vary intraspecifically in other species but at present, not in *P. angelica, P. antennalis,* and *P. obscura*. Since they are not known to be sympatric, distribution should be considered when keying specimens of these three species. It is expected that the females of *P. obscura* will have infuscated wings and that the abdomen will be sublaterally bare on tergites 2-5 or 3-5.

Distribution (Fig. 71). *Pseudodinia obscura* is known only from the type locality in Chiapas, Mexico. This is the most southerly record for any member of the *varipes* group.

Biology. *Pseudodinia tuberculata* and *P. meridionalis* have been collected near this locality but at 300-500 feet lower altitude. No specific data are known.

Etymology. From the Latin *obscurus* meaning "dark, indistinct", the specific epithet *obscura* refers to the infuscation of the wing.

Pseudodinia antennalis Malloch

Figs. 34-36, 71.

Pseudodinia antennalis Malloch, 1940: 269.
Pseudodinia antennalis; McAlpine 1965: 708.

Description. Body length 2.0-2.8 mm. Predominantly pruinose grey, of varying intensity, except scape, pedicel, and at least basal third of flagellomere 1 yellow to sometimes brown; flagellomere 1 apically yellow to brown. Palp, knees, tarsi, and apical 0.3 or more (rarely nearly entire) of tibiae yellow. Wing hyaline. Abdomen of male ranging from entirely pruinose to broadly pruinose across tergites 1-3 leaving tergites 4-5 essentially bare or with narrowing median pruinose strip on tergite 4 and sometimes also on tergite 5, and sublateral bare areas present on tergites 2-5. Of female, with sublateral bare areas on tergites 2-5 (only 3-5 on most southwestern specimens) slightly larger, tergites 4-5 usually entirely bare; tergite 4 sometimes with basal strip of pruinosity widened medially, but not with median strip as in some males.

Head. Height 1.2-1.4X length; width 1.7-2.0X length. Height of compound eye 1.0-1.2X length, 4.9-6.8X genal width. Frontal width 1.1-1.5X length. Upper orbital seta 0.8-1.0X length of inner vertical seta, arising at 0.1-0.3 of frontal length. Lower orbital seta 0.6-0.7X length of upper orbital seta, arising at 0.5-0.7 of frontal length. Ocellar seta 0.8-1.0X length of upper orbital seta. Ocellar setulae in 1-3 pairs. Gena with 6-9 setae. Length of flagellomere 1 0.8-1.0X height, anterodorsally rounded, rarely with slight preapical angle.

Thorax. Katepisternum with two or three setulae anterior to posterodorsal seta.

Anterior acrostichal setulae sometimes extending anterior to level of postpronotal seta, but weaker than following acrostichals.

Male terminalia. Tergite 6 divided medially, length 0.3X tergite 5; syntergosternite 7+8 0.4-0.5X length of tergite 5. Strap-like sclerite represented by a separate sclerotized area on left anterolateral corner of each of sternites 6 and 7, bearing the left sensory setula; that of sternite 7 not extending to spiracle 7. Genitalia as in Figs. 34-36. Epandrium usually broadly rounded apically, although sometimes more acute in profile (Fig. 34a). Paramere of variable profile shape, due mostly to differential torsion. Gonopod weakly differentiated (Fig. 34) to broadly truncate (Fig. 36), bearing two or three setae. Apex of aedeagus, in ventral view, rounded with preapical keels poorly developed; keels relatively approximate with slight median depression between them.

Type material examined. *Holotype* ♂ (dissected). U.S.A. **Virginia:** Chain Bridge, 10.ix.1922, J.R.Malloch (USNM). *Paratypes* (3 ♂ , 4 ♀ , and 2 others lacking abdomen, all at USNM). CANADA. **Manitoba:** Aweme, 7.viii.1916, N.Criddle, 1 ♂ and 1 other paratype lacking both head and abdomen; Treesbank, 27.viii.1915, N. Criddle, 1 ♂ . U.S.A. **Arizona:** Tucson, 17.vi.1917, J.M.Aldrich, 1 ♂ . **Maryland:** Chesapeake Beach, 18.viii.1922, J.R. Malloch, 1 ♀ ; Glen Echo, 6.viii.1922, J.R. Malloch, 1? (abdomen missing, possibly slide mounted at USNM). **Tennessee:** Knoxville, 28.viii.1916, J.M. Aldrich, 1 ♀ . **Virginia:** same data as holotype, 2 ♀ (1 abdomen slide mounted in euparal).

Two other paratypes listed by Malloch (1940), the male from Tennessee: Knoxville, 28.viii.1916, J.M.Aldrich, and the female from Utah: Salt Lake City, 18-20.vii.1917, J.M.Aldrich, are referred to *P. pruinosa* (Southern variant). These specimens lack the completely pruinose frons of *P. antennalis* with only the vertex and the frons pruinose to the level of the upper orbital seta. The scape, pedicel, and palp are yellow but flagellomere 1 is only very narrowly pale basally. The male from Knoxville was dissected and is readily assigned to *P. pruinosa* based primarily on the shape of the aedeagus as discussed under that species.

Only the paratypes from Manitoba, Arizona, Utah *(P. pruinosa),* and Tennessee (one male, *P. pruinosa*) bear USNM Paratype No. 51613 labels, but it is clear that the above specimens account for all the material that Malloch listed in his description.

Other material examined (235 ♂ , 154 ♀). CANADA. **Manitoba:** 2miW Stockton, J.G.Chillcott, spruce sand community, 16.vii.1958, 1 ♂ , 28.vii.1958, 1 ♂ (BRI); Bald Head Hills, 12kmN Glenboro [Spruce Woods Forest Reserve], swept from *Andropogon gerardi* Vit., 1.viii.1983, K.N.Barber & W.E.Ralley, 6 ♂ , 4 ♀ , 4.viii.1983, K.N.Barber, 2 ♂ , 2 ♀ (GUE). **Ontario:** Grand Bend, 20.vii.1939, G.E.Shewell, 1 ♂ (BRI); Grand Bend, Pinery Prov. Park, K.N.Barber, swept from *Andropogon gerardi* Vit., 15.viii.1982, 3 ♂ , 25.viii.1983, 4 ♂ , 5 ♀ , 19.viii.1984, 34 ♂ , 12 ♀ (GUE), 10 ♂ , 10 ♀ (BRI), 5 ♂ , 5 ♀ (USNM), 5 ♂ , 5 ♀ (UAT), 5 ♂ , 2 ♀ (CAS), 2 ♂ , 2 ♀ (USU), 2 ♂ , 2 ♀ (LACM); Grand Bend, Pinery Prov. Park, K.N.Barber, reared from a third-instar larva *ex. Andropogon gerardi* Vit., 25.viii.1983, 1 ♂ (GUE); Sauble Beach, K.N.Barber, swept from *Andropogon gerardi* Vit., 9.viii.1983, 2 ♀ , 10.viii.1983, 3 ♀ (GUE); Ipperwash Prov. Park, 14.vii.1980, K.N.Barber, swept from *Andropogon gerardi* Vit., 1 ♂ (GUE); Windsor, Ojibway Prairie Reserve, K.N.Barber, swept from *Andropogon gerardi* Vit., 21.vii.1981, 1 ♀ , 18.viii.1983, 1 ♀ (GUE). U.S.A. **Arizona:** Tucson, Upper Sabino Canyon, B.A.Foote, 10.v.1971, 1 ♂ , 1 ♀ (BRI), 12.v.1971, 1 ♀ (OKSU); Pima Co., Quinlan Mts., Kitt Peak, 6875′, 4.viii.1977, T.P.Sluss, 10 ♂ , 20 ♀ (UAT), 5 ♂ , 5 ♀ (USNM), 3 ♂ , 5 ♀ (GUE), 3 ♂ , 4 ♀ (BRI); Pima Co., Mt. Lemmon, 16.v.1975, T.P.Sluss, 1 ♀ (UAT); Pima Co., Santa Catalina Mts., Bear Can., Mi.10 Hitchcock Hwy., 3.vii.1961, L.B.Koenig, 1 ♀ (UCB); Santa Rita Mts., Madera Canyon, K.N.Barber, 25.iv.1979, 1 ♂ , 2 ♀ , 26.iv.1979, 2 ♂ , 1 ♀ (GUE); Huachuca Mts., Miller Canyon, 5500′, 7.vi.1969, S.L.Wood, 7 ♂ , 9 ♀ (OSU); Miller Canyon, 30.iv.1948, A.L.Melander, 1 ♀ (USNM); W. side Huachuca Mts., Ramsey Canyon, 22.vi.1974, T.P.Sluss, 3 ♂ , 3 ♀ (UAT); Cochise Co., W. side Huachuca Mts., Sunnyside Canyon, 6000′, 4.viii.1952, H.B.Leech & J.W.Green, 2 ♂ (CAS); Scotia Canyon, nr. Sunnyside, 14.v.1971, B.A.Foote, 1 ♀ (OKSU); Cochise Co., Chiricahua Mts., 1miS Rustler Pk., 27.v.1975, T.P.Sluss, 1 ♂ , 1 ♀ (UAT); Cochise Co., Rustler Park, 22.v.1974, T.P.Sluss, 1 ♂ (UAT); Cochise Co., Chiricahua Mts., Barfoot Lookout, T.P.Sluss, 6.ix.1970, 1 ♂ (BRI), 17.ix.1972, 1 ♀ , 8.vii.1973, 1 ♀ (UAT); Cochise Co., Chiricahua Mts., Onion Saddle, 26.viii.1973, T.P.Sluss, swept from *Muhlenbergia* sp., 1 ♀ (UAT), 1 ♂ [lacking plant record] (BRI); Cochise Co., S.W.R.S., 5miW Portal, 5400′, 24.ix.1966, P.H. Arnaud, Jr., 1 ♀ (CAS); Cochise Co., S.W.R.S., 7.vi.1957, J.W. Green, 1 ♂ (CAS); Cochise Co., S.W.R.S., 9.ix.1970,

T.P. Sluss, 1 ♂, 2 ♀ (BRI), 1 ♀ (UAT); Cochise Co., S.W.R.S., 8.v.1967, D.M. Wood, 1 ♂ (BRI); Chiricahua Mts., 4000′, 15.[Je or Jl].1952, A.H. Sturtevant Collection, 2 ♂ (USNM). **Connecticut:** Hartford, 6.vii.1946, L.C.Rosene, sweeping in swamp, 1 ♀ (CTAS). **Georgia:** Rabun Co., Rabun Bald, 3000′, 14.vii.1957, J.G.Chillcott, 1 ♂, 1 ♀ (BRI); Brasstown Bald, 4800′, 19.viii.1957, J.G.Chillcott, 2 ♂ (BRI). **Maryland:** Suitland Bog, 14.vi.1951, W.W.Wirth, 1 ♂ (USNM); Cupids Bower Is., 4 vii.1915, R.C.Shannon, 1 ♂ (USNM). **Massachusetts:** Truro, Cape Cod, 3.viii.1964, J.R. Vockeroth, 1 ♂ (BRI); Vineyard Haven, 17.viii.1954, A.H.Sturtevant, 3 ♀ (USNM); Middleboro, A.H.Sturtevant Collection, 4.viii.1924, 1 ♀, 28.vii.1922, 1 ♂, 2 ♀ (USNM); Holliston, N.Banks, 17.vii.[?], 1 ♂, 7.viii.[?], 1 ♀, 11.viii.[?], 1 ♂, 1 ♀ (MCZ). **Michigan:** Berrien Co., Warren Dunes St. Park, 22.viii.1981, M&A.O'Brien, 1 ♂ (UMIC). **Minnesota:** Taylors Falls, 2.viii.1925, S.Kepperley, 1 ♂, 1 ♀ (UMIN). **Missouri:** Carter Co., 4.5miSW Van Buren, Ridge Road at Road C, 4.viii.1967, H.Leech, at light, dry pine-oak woods area, 1 ♂, 1 ♀ (CAS). **New Jersey:** Seaside Park, 20.viii.[?], Weiss & West, 2 ♀ (MCZ). **New Mexico:** Pinos Altos, Cherry Ck., 22.vi.1953, W.W.Wirth, 1♀ (USNM); Alomogordo, 30.iv.1902, [no collector], 1 ♀ (ANSP); Catron Co., 5miW Luna, 7400′, 9-14.vii.1979, S&J.Peck, San Francisco River, pond. pine-meadow [Malaise trap], 1 ♂ (GUE). **New York:** Long Island, Huntington, Kalbfleisch Res. Station, 28.vii.1962, P.H.Arnaud, Malaise trap, 1 ♂ (AMNH). **North Carolina:** Highlands, 3800′, J.G.Chillcott, 15.vii.1957, 1 ♀, 17.viii.1957, 1 ♀ (BRI); Highlands, Whitesides Mt., 4900′, J.G.Chillcott, 20.vii.1957, 2 ♂, 2 ♀, 21.viii.1957, 1 ♀ (BRI); Highlands, Whiteside Cave, 2800′, 11.viii.1957, J.G.Chillcott, 1 ♀ (BRI); Highlands, Whiteside Mt., 21.viii.1957, C.J.Durden, 1 ♂ (BRI); Highlands, Little Bear Pen Mt., 5.viii.1957, W.R.Richards, 1 ♂ (BRI); Looking Glass Rock, nr. Pisgah Forest, 2500′, 19.vii.1957, J.G.Chillcott, 1 ♀ (BRI); Lake Toxaway, 12.vii.1957, J.G.Chillcott, 1 ♂ (BRI); Black Mt. City, Black Mts., 12.viii.1930, Banks, 1 ♂ (MCZ); Pettigrew St. Park, 1.ix.1963, B.S.Heming, 1 ♂ (GUE); Gates Co., 3.ix.1963, B.S.Heming, 1 ♂ (GUE); Cumberland Co., Fort Bragg, J.D.Birchim, 14.v.1967, 3 ♂, 1 ♀, 15.v.1967, 11 ♂ (CAS), 16.v.1967, 35 ♂, 5 ♀ (CAS), 5 ♂, 2 ♀ (GUE), 28.v.-3.vi.1967 [some apparently mistakenly printed 1968], 27 ♂, 1 ♀, 6-13.vi.1967, 1 ♂ (CAS). **Tennessee:** Townsend, 2.vi.1979, M.J.Sharkey, 1 ♀ (GUE); Gatlinburg, GSMNP, R.H.Whittaker, sweeps, 17.vii.1947, pine-oak forest, 1500′, 1 ♂, 19.vii.1947, pine heath, 3500′, 1 ♂ (ISU). MEXICO. **Zacatecas:** Laguna Balderama, 25miW Fresnillo, 7900′, 23.vi.1954, R.H.Brewer, 1 ♀ (CAS). One additional female with the following data: W.H., "8.10.1913", A.H.Sturtevant Collection (USNM).

Remarks. *Pseudodinia antennalis* can be distinguished from all other species by the combination of its pruinose frons, basally yellow flagellomere 1, yellow tarsi, and hyaline wing. The extent of abdominal pruinosity of the male varies more than in any other species, from predominantly bare on tergites 4 and 5 to completely pruinose. The distinctive form of the male aedeagus is virtually diagnostic on its own. Until further data become available, the name *P. antennalis* is applied to all the forms discussed below.

Variation. This is a widespread but infrequently collected species. Over half the specimens examined are from only three series. There is considerable variation in this species and comparison of the extremes only would suggest that they represent distinct species.

The pruinosity is generally reduced and tergites 4 and 5 of the male are predominantly bare in the Canadian specimens. This condition is apparent in some specimens from Maryland, Massachusetts, North Carolina, and Georgia. A completely pruinose abdomen occurs in male specimens from Massachusetts, North Carolina, and Georgia. The long series from Fort Bragg includes many males with entirely though lightly pruinose abdomens, and a minority with sublateral bare areas on tergites 3-5. The holotype, previously dissected, can be seen to bear microtrichia (pruinosity) over the entire abdomen except for a small dorsolateral area on the left side of tergite 4, possibly due to abrasion.

All western males (except the series from Kitt Peak, Arizona) have the abdomen completely pruinose and densely so, the density comparable to some eastern males. The series from Kitt Peak contains one male with this characteristic western-type pruinosity extending over the entire abdomen. All other males in the series have tergites 4 and 5 predominantly bare with only a fairly narrow medial strip of pruinosity running a variable length along tergite 4. The broadly truncate gonopod (Fig. 36) is a fairly consistent character within this series but is very closely approximated by at least one other male from the west and the east, as well as by the completely pruinose co-series male. There are no consistent differences between this series and the other western specimens and it is considered a conspecific variant at this time. Further collections in the west might provide intergrades.

There are two regional genitalic variations noted. Eastern specimens tend to have the aedeagus relatively thick at the apex in lateral view (Fig. 35a). In western specimens, the aedeagus is thinner at the apex in lateral view (Fig. 36a). This, however, is not an entirely consistent difference (Fig. 34a).

Some western specimens have the epandrium somewhat acute apically. This is roughly correlated with the antenna and tibiae being more extensively yellow, flagellomere 1 entirely so, and the tibiae with only an indistinct darkening in the basal third. This variation also is apparently not discrete and is best exemplified by the series from Miller Canyon (S.L. Wood) which includes the full range of variation.

There are three dissections that have a supernumerary seta present at the lateral base of the right paramere. This has also been noted in the holotype of *P. angelica* (Fig. 33b) and one specimen of *P. occidentalis.* One specimen in the series from Fort Bragg has the anepisternal seta duplicated. Both conditions are considered anomalous.

Distribution (Fig. 71). *Pseudodinia antennalis* is widely distributed, occurring in eastern North America, southern Arizona, New Mexico, and central Mexico, but it is noticeably absent from the midwest corridor from North Dakota to Texas. This is a poorly collected area for this genus as similarly sparse records of the widespread *P. pruinosa* demonstrate (Fig. 69). More extensive collecting in this area might provide additional records.

Biology. This species has been associated with the grass *Andropogon gerardi* (Gramineae: Andropogonaceae) in Ontario and Manitoba (Barber 1984). It probably feeds on a species of mealybug, *Trionymus* sp., found in the leafsheaths of this grass in Ontario. *Pseudodinia antennalis* is known to co-occur with *P. pruinosa, P. varipes,* and *P. melanitida* in Windsor, Ontario.

The only other plant with which *P. antennalis* has been associated is the grass *Muhlenbergia* sp., from which T.P. Sluss also collected *P. pruinosa, P. latiphallis,* and *Chamaemyia herbarum* (Robineau-Desvoidy).

Pseudodinia nigritarsis new species

Figs. 16, 67.

Description. Body length 3.1-3.4 mm. Predominantly dark grey pruinose. Head pruinose except for frons, which is bare and shiny from level of upper orbital seta anteriorly; bare area extending onto parafacial to level of antennal base. Antenna nearly unicolorous dark brown or black in female; with scape, pedicel, and flagellomere 1 to base of arista yellowish brown in male. Thorax entirely covered with dark grey pruinosity though appearing shiny black in some angles. Legs mostly black except knee of foreleg, and apical 0.3-0.4 of all tibiae yellow. Tarsomeres 1-5 entirely black. Wing hyaline. Abdomen of male with dorsal wedge of pruinosity extending broadly across tergites 1-4, with successively larger sublateral bare areas on tergites 3-5 leaving tergite 5 with narrow medial strip of pruinosity in basal half. Abdomen of female with dorsal pruinosity extending broadly across tergites 1-3 with sublateral bare areas on tergites 2-3; tergites 4 and 5 entirely bare.

Head. Height 1.2X length; width 2.0X length. Height of compound eye 0.8-0.9X length, 3.6-3.8X genal width. Frontal width 1.4-1.5X length. Upper orbital seta 0.8-0.9X length of inner vertical seta, arising at 0.2 of frontal length. Lower orbital seta 0.9-1.0X length of upper orbital seta, arising at 0.5-0.6 of frontal length. Ocellar seta 1.1X length of upper orbital seta. Ocellar setulae in two pairs. Gena with nine or ten setae. Length of flagellomere 1 0.9X height, with slight preapical angulation anterodorsally.

Thorax. Katepisternum with three setulae anterior to posterodorsal seta. Anterior acrostichal setulae barely extending to level of postpronotal seta, slightly weaker than following acrostichals.

Male terminalia. Tergite 6 complete, not medially divided, length 0.2X tergite 5; syntergosternite 7+8 0.3X length of tergite 5. Sternites 6 and 7 very weakly sclerotized transversely near anterior margin; strap-like sclerite well developed, running uninterruptedly from left sensory setula of sternite 6 to that of sternite 7 and continuing posteriorly to

encircle spiracle 7. Genitalia as in Fig. 16. Epandrium moderately tapered. Paramere with well defined, sharply bevelled edge. Gonopod long for this species group, about 0.4X paramere, bearing three or four setae. Aedeagus roundly tapered, in ventral view, with shallow apical emargination and preapical keels poorly developed but noticeably higher in basal half.

Type material examined. *Holotype* ♂ (dissected). U.S.A. **California:** Sta. Cruz. Is., Cal. Beach at Water Cyn., 2.v.1969, R.O.Schuster (UCD). *Paratype* (1 ♀). Same data as holotype (UCD). Both of the type specimens lack one complete flagellum and flagellomeres 3-4 of the opposite antenna.

Remarks. *Pseudodinia nigritarsis* is the only species in which tarsomere 1 is black along with tarsomeres 2-5. In other species of *Pseudodinia,* there is considerable intraspecific variation in the darkening of tarsomeres 2-5.

The undivided condition of tergite 6 in the male requires further verification. This is a specific character for *P. cinerea* but one specimen each of *P. varipes* and *P. occidentalis* have an undivided and a partially divided tergite 6, respectively.

Distribution (Fig. 67). *Pseudodinia nigritarsis* is known only from Santa Cruz Island, California.

Biology. No specific data are known. *Pseudodinia angelica* is the only other species of *Pseudodinia* known to occur on Santa Cruz Island.

Etymology. From the Latin *niger* meaning "black", the specific epithet *nigritarsis* refers to the entirely black tarsi which are unique.

Pseudodinia nitens (Melander and Spuler)

Figs. 32, 70.

Piophila nitida Wulp, 1867: 160 (preoccupied by *Piophila nitida* Brullé 1832).
Piophila nitens Melander and Spuler, 1917: 70 (new name for *Piophila nitida* Wulp).
Pseudodinia nitida (Wulp), McAlpine 1965: 708; not *Pseudodinia nitida* Melander 1913: 295, McAlpine 1965: 708, notwithstanding.
Pseudodinia nitens; McAlpine 1965: 708, holotype only.

Description. Body length 2.2-3.0 mm. Predominantly dark grey pruinose except knees, tarsomere 1, and apical 0.2-0.3 of tibiae yellow; tarsomeres 2-5 gradually darkening to brown. Antenna dark brown to black, scape and pedicel sometimes paler. Palp brown to black, sometimes basally paler. Pruinosity present on ocellar triangle, on vertex to level of posterior ocelli, and on orbits usualy to level of median ocellus. Frons bare, shiny black, bare area extending medially onto parafacial to level of antennal base or below. Head otherwise pruinose. Wing lightly infuscate. Abdomen of male with dorsal wedge of pruinosity extending broadly across tergites 1-4; tergite 5 with at least a narrow medial strip of pruinosity running entire length, sometimes nearly entirely pruinose; successively larger sublateral bare areas present on tergites 3-5 or 4-5. Of female, with pruinosity extending narrowly to apex of tergite 4, at least as a few scattered microtrichia, and sometimes slightly onto medial base of tergite 5; with successively larger sublateral bare areas on tergites 2-5.

Head. Height 1.3-1.5X length; width 1.8-2.0X length. Height of compound eye 1.0-1.1X length, 4.1-6.0X genal width. Frontal width 1.3-1.6X length. Upper orbital seta 0.8-0.9X length of inner vertical seta, arising at 0.1-0.3 of frontal length. Lower orbital seta 0.6-0.9X length of upper orbital seta, arising at 0.5-0.6 of frontal length. Ocellar seta 0.9-1.1X length of upper orbital seta. Ocellar setulae in 1-3 pairs. Gena with 4-7 setae. Length of flagellomere 1 0.8-1.0X height, anterodorsally rounded.

Thorax. Katepisternum with two setulae anterior to posterodorsal seta. Anterior acrostichal setulae rarely extending anterior to level of postpronotal seta, if so then weaker than following acrostichals.

Male terminalia. Tergite 6 divided medially, length 0.3-0.4X tergite 5; syntergosternite 7+8 0.4X length of tergite 5. Strap-like sclerite represented by an indistinct sclerotization on left anterolateral corner of each of sternites 6 and 7, bearing left sensory setula; that of sternite 7 not extending to encircle spiracle 7. Genitalia as in Fig. 32. Epandrium strongly narrowed, almost parallel-sided on apical half when viewed laterally. Paramere moderately developed. Gonopod weakly differentiated, bearing two or three setae. Aedeagus, in lateral view, tapering to a narrow tip; in ventral view, apex somewhat rounded to slightly emarginate; preapical ventral keels weakly differentiated, at most a median raised area with slight median depression.

Type material examined. *Holotype* ♀ . U.S.A. **Wisconsin:** Kumlien [no other data] (RNHL). Both flagella are missing and there is some green corrosion on the pin. Otherwise, the holotype is in good condition.

Other material examined (23 ♂ , 16 ♀). U.S.A. **Arizona:** Apache Co., Alpine, Luna Lake, 7900′, 9-14.vii.1979, S&J. Peck, pine meaows [Malaise trap], 1 ♂ (BRI); Flagstaff, Oak Creek Canyon at Sterling Canyon, 5900′, 17-25.vii.1979, S&J.Peck, riparian woods, Malaise trap, 1♂ (BRI); Graham Co., Pinaleno Mts., Heliograph Park, 15.vii.1972, T.P.Sluss, 1 ♂ (UAT); Cochise Co., Chiricahua Mts., Barfoot Lookout, 23.v.1974, T.P.Sluss, 1 ♂ (UAT); Grand Canyon Nat. Park, No. Rim, 15.vii.1954, W.L.Downes, 5 ♀ (ISU). **Colorado:** Saguache Co., Valley View Springs about 7miE of Mineral Hot Springs on W. foot of Sangre de Cristo range, 8500′, 13.viii.1965, H.B.Leech, 1♂ , 1 ♀ (CAS); Fairplay, 3.viii.1938, M.James & U.Lanhan, 1 ♀ (GUE); Teller Co., Florissant Fossil Beds, 8.viii.1973, D.Wilder & D.Shetlar, 1 ♀ (CAS); Estes Park, 14.vii.1934, A.L.Melander, 1♀ (USNM). **New Mexico:** Catron Co., 8miSE Luna, 7500′, 9-14.vii.1979, S&J. Peck, pond. pine at stream [Malaise trap], 2♂ , 1 ♀ (BRI), 3 ♂ (GUE). **Utah:** Garfield Co., Bryce Canyon, 19.vii.1954, W.L.Downes, 1♂ , 3 ♀ (ISU); Summit Co., Henrys Fork Park, 1-10.viii.1979, 9000′, S&J.Peck, meadow w/willow, Malaise trap, 5♂ , 1♀ (BRI), 5♂ , 1 ♀ (GUE). **Washington:** Mt. Adams, 24.vii.1921, A.L.Melander, 1 ♂ (USNM). **Wyoming:** Yellowstone Park, Upper Geyser Basin, 7.viii.1918, A.L.Melander, 1♂ , 1 ♀ (USNM).

Remarks. *Pseudodinia nitens* can be distinguished from all other species of the *varipes* group by a combination of its predominantly shiny frons, yellow tarsomere 1, and the extensively pruinose abdomen. The abdominal pruinosity of *P. nitens* extends the full length of tergite 4 in the female and across tergite 5 in the male, similar to the conditions found in *P. hamata* and, to a lesser extent, *P. angustata.* The male genitalia are very similar to those of *P. angustata* in the possession of narrow epandrial apices and the relatively flat, preapical ventral area of the aedeagus.

The holotype female is readily referrable to this species with its extensively pruinose abdomen, vertex, and ocellar triangle. This rather pruinose condition is in direct opposition to previous literature and keys which actually refer to the very shiny *P. nitida* Melander (= *P. melanitida* new name). The somewhat difficult nomenclatural history of *P. nitens* requires some explanation.

The deposition of the holotype in RNHL, The Netherlands, restricted access to it by North American dipterists. Melander and Spuler (1917), when reviewing the Nearctic Piophilidae, drew attention to the description of *Piophila nitida* Wulp (1867), which suggested the genus *Pseudodinia,* a genus in which the senior author had previously described *Pseudodinia nitida* Melander (1913). They also uncovered the senior primary homonym of Brullé (1932) and renamed *Piophila nitida* Wulp as *Piophila nitens* Melander and Spuler.

When McAlpine (1965) catalogued the Nearctic Chamaemyiidae, C.W. Sabrosky, USNM, who had examined the holotype of *Piophila nitida* Wulp, confirmed its proper placement in the genus *Pseudodinia.* McAlpine (1965) used this information and formally transferred Piophila nitida Wulp and *Piophila nitens* Melander and Spuler to the genus *Pseudodinia.* This action created a junior secondary homonym of *Pseudodinia nitida* Melander which then had to be rejected [ICZN Article 57(b)], but it was wrongly treated by McAlpine as a junior synonym of *Pseudodinia nitens* Melander and Spuler. The senior homonym, *Pseudodinia nitida* (Wulp), could not be used since it had already been permanently rejected as a junior primary homonym in *Piophila* by Melander and Spuler

according to ICZN Article 57(a).

Since that time, there has been a reliance on Melander's (1913) description of *Pseudodinia nitida* and application of the senior synonym, *Pseudodinia nitens,* to this description and to any shiny specimen of *Pseudodinia.* This has led to the misconception of *P. nitens* as being a very shiny species.

Variation. The holotype has perhaps the most darkly infuscated wing of any of the specimens studied. Despite being an isolated eastern record for this otherwise western montane species, this wing character along with the abdominal pruinosity, readily places this holotype female in this species.

Distribution (Fig. 70). *Pseudodinia nitens* has a primarily western montane distribution, with the type locality in Wisconsin, an apparently disjunct record. The latter record is represented by a nonspecific symbol in the centre of the state in Fig. 70.

Biology. This species has been taken with *P. hamata* and *P. pruinosa* at Luna Lake, Arizona, and each of these two species at two other localities in Arizona. Collection data suggest riparian woods and pine meadows as possible habitats.

Pseudodinia latiphallis new species

Figs. 20, 67.

Description. Body length 2.0-2.8 mm. Predominantly dark grey pruinose except knees narrowly brown, and tarsi and apical 0.2-0.3 of tibiae yellow. Antenna and palp black. Ocellar triangle, vertex, and orbits posterior to level of median ocellus pruinose, sometimes forming a nearly complete transverse band to level of median ocellus; frons otherwise bare, shiny black. Parafacial and gena predominantly bare with narrow lateral band of pruinosity immediately next to eye and along lower margin of gena. Wing hyaline to very lightly infuscate. Abdomen of male with dorsal wedge of pruinosity extending broadly across tergites 1-3, at most, continuing as a narrow medial strip to apex of tergite 4; successively larger sublateral bare areas on tergites 2-4 leaving tergite 4 predominantly and tergite 5 entirely bare. Of female, with pruinosity not extending onto tergite 4; sublateral bare areas on tergites 2 and 3 somewhat larger.

Head. Height 1.1-1.3X length; width 1.7-1.8X length. Height of compound eye 0.9-1.0X length, 4.8-6.1X genal width. Frontal width 1.0-1.1X length. Upper orbital seta 0.9-1.0X length of inner vertical seta, arising at 0.2-0.3 of frontal length. Lower orbital seta 0.6-.07X length of upper orbital seta, arising at 0.5-0.6 of frontal length. Ocellar seta 0.6-0.7X length of upper orbital seta. Ocellar setulae in one or two pairs. Gena with 4-7 setae. Length of flagellomere 1 0.8-1.0X height, anterodorsally rounded.

Thorax. Katepisternum with two setulae anterior to posterodorsal seta. Anterior acrostichal setulae sometimes extending anterior to level of postpronotal seta, but weaker than following acrostichals.

Male terminalia. Tergite 6 divided medially, length 0.2-0.3X tergite 5; syntergosternite 7+8 0.4-0.5X length of tergite 5. Strap-like sclerite represented by a separate sclerotized area on left anterolateral corner of each of sternites 6 and 7, bearing left sensory setula; that of sternite 7 not extending to spiracle 7, sometimes absent. Genitalia as in Fig. 20. Epandrium relatively broad in lateral profile with apices slightly deflected posteriorly. Paramere relatively broad. Gonopod moderately developed, bearing two or three setae. Aedeagus relatively heavily sclerotized, usually evenly curved in lateral profile; in ventral view, very wide with very well developed preapical keels which continue basally as low ridges bordering the median concavity.

Type material examined. *Holotype* ♂ (not dissected). MEXICO. **Durango:** 30miW Durango, 8000′, 6.v.1961, Howden & Martin (BRI). *Paratypes* (10 ♂, 13 ♀). U.S.A. **Arizona:** Pima Co., Mt. Lemmon, 16.v.1975, T.P.Sluss, 2 ♂, 2 ♀ (USNM), 3 ♂, 6 ♀ (UAT); Cochise Co., Chiricahua Mts., Barfoot Lookout, 17.v.1972, T.P.Sluss, swept from *Muhlenbergia* sp., 1 ♂ (UAT); Madera Canyon, Santa Rita Mts., 26.iv.1979, K.N.Barber,

1 ♂ (GUE). MEXICO. **Durango:** same data as holotype, 3 ♂ , 5 ♀ (BRI).

Remarks. *Pseudodinia latiphallis* can be confused with *P. pruinosa* with its anteriorly bare frons, very grey thorax, and extensively (variably in *P. pruinosa*) bare parafacial and gena. All specimens of *P. latiphallis* have been taken with *P. pruinosa* and most can be recognized by their relatively short ocellar seta. *Pseudodinia slussi* might also be confused with *P. latiphallis* but the specimens from Arizona are considerably less pruinose than those of *P. latiphallis*. Specimens of the similar *P. varipes* often have an anterodorsal angulation on flagellomere 1. Confident identification of these four species can only be made by examining the male genitalia. Specimens of *P. occidentalis* from Arizona have strong genal setae which are subequal to the postgenal setae.

Most male specimens share with *P. varipes* a gradually curved aedeagus in profile with very well developed preapical keels, and a slightly anteroventrally emarginate epandrium. These two species appear to be parapatric or narrowly sympatric.

Variation. The Durango specimens have the epandrial apices most strongly curved posteriorly.

Distribution (Fig. 67). *Pseudodinia latiphallis* is known from only four collections in montane areas of Arizona and Durango, Mexico.

Biology. As mentioned above, all specimens have been taken with *P. pruinosa.* In addition, the series from Durango was taken with *P. cinerea* and *P. angustata,* and the specimens from Madera Canyon and Mt. Lemmon were taken with *P. antennalis.*

The one plant record of *Muhlenbergia* sp. provides little information since *P. antennalis* and two variants of *P. pruinosa* have also been taken on this plant.

Etymology. From the Latin *latus* and Greek *phallos* meaning "wide" and "penis", respectively, the specific epithet *latiphallis* refers to the distinctively, preapically widened aedeagus.

Pseudodinia slussi new species

Figs. 17, 67.

Description. Body length 2.3-2.8 mm. Shiny black to lightly grey pruinose except knees, tarsi, and apical 0.2-0.3 of tibiae yellow. Antenna black, except scape and pedicel sometimes dark brown. Ocellar triangle sometimes lightly pruinose. Vertex, orbits, and frons entirely bare. Parafacial and gena bare, shiny black except oral margin narrowly pruinose. Face lightly pruinose, rather shiny medioventrally, becoming more heavily pruinose toward the densely pruinose lunule. Head otherwise grey pruinose. Thorax entirely lightly pruinose, pruinosity heavier along notopleural suture and upper anepisternum; notum appearing shiny. Abdomen of both sexes with dorsal wedge of pruinosity extending to posterior margin of tergite 3, at most tergite 4 with a slight medial widening of basal strip; tergites 2-5 with successively larger sublateral bare areas leaving tergites 4 and 5 essentially bare.

Head. Height 1.2-1.3X length; width 1.7-2.0X length. Height of compound eye 1.0-1.1X length, 4.3-5.9X genal width. Frontal width 1.2-1.4X length. Upper orbital seta 0.8-1.0X length of inner vertical seta, arising at 0.1-0.3 of frontal length. Lower orbital seta 0.5-0.7X length of upper orbital seta, arising at 0.5-0.6 of frontal length. Ocellar seta 0.8-1.0X length of upper orbital seta. Ocellar setulae in one or two pairs. Gena with 5-7 setae. Length of flagellomere 1 0.8-0.9X height, anterodorsally rounded.

Thorax. Katepisternum with one or two setulae anterior to posterodorsal seta. Anterior acrostichal setulae extending anterior to level of postpronotal seta, weaker or subequal in strength to following acrostichals.

Male terminalia. Tergite 6 divided medially, length 0.2-0.3X tergite 5; syntergosternite 7+8 0.4-0.5X length of tergite 5. A single, uninterrupted strap-like sclerite bearing left sensory setulae of sternites 6 and 7, and extending posteriorly to encircle left spiracle 7.

Genitalia as in Fig. 17. Epandrium with relatively broadly rounded apices. Paramere relatively elongate and straight, particularly on medial surface when viewed ventrally. Gonopod relatively well developed as a short but quite narrow projection bearing two or three setae. Apex of aedeagus, in ventral view, truncate to slightly emarginate; preapical median area raised with an indistinct median depression; distinct keels not evident.

Type material examined. *Holotype* ♂ (dissected). U.S.A. **Arizona:** Pima Co., Kitt Peak, Quinlan Mts., 6875′, 4.viii.1977, T.P.Sluss (USNM; courtesy of UAT). *Paratypes* (5 ♂, 3 ♀). U.S.A. **Arizona:** same data as holotype, 2 ♂, 1 ♀ (UAT), 1 ♂, 1 ♀ (BRI), 1 ♀ (USNM); Sulphur Draw, s. Portal, 29.v.1967, C.W.Sabrosky, 1 ♂ (USNM). **New Mexico:** Torrance Co., Town of Gran Quivira 6500′, 20.viii.1967, H.B.Leech, 1 ♂ (CAS).

Remarks. *Pseudodinia slussi* can be confused with *P. pruinosa, P. varipes,* and, to a lesser extent, *P. latiphallis.* The populations of *P. occidentalis* from Arizona have distinctively enlarged genal setae, while *P. melanitida* is apparently allopatric. The variable density of thoracic pruinosity necessitates examination of the male genitalia for confident identification. The complete, uninterrupted strap-like sclerite on the left side of sternites 6 and 7 of the male, which also encircles spiracle 7, is a condition otherwise found only in the distinctive *P. nigritarsis* and *P. cinerea.*

The Kitt Peak specimens were taken with a larger number of *P. occidentalis* which have enlarged genal setae and strong anterior acrostichal setulae. This allowed the recognition and designation of the three female paratypes listed above. Dr. Sluss misidentified the series from Kitt Peak as *P. nitens* [of authors, = *P. melanitida*] and the Gran Quivira specimen as *P. varipes* [of authors, = *P. pruinosa*].

Variation. The Gran Quivira specimen has the epandrial apices considerably wider than those of the five other male specimens listed above.

Distribution (Fig. 67). *Pseudodinia slussi* is known from only three montane localities in Arizona and New Mexico.

Etymology. This species is named after Dr. T.P. Sluss, Fort Lewis College, Durango, Colorado, whose diligent collecting in the southwestern United States provided a large proportion of the specimens studied here.

Pseudodinia melanitida new name
Figs. 18, 68.

Pseudodinia nitida Melander, 1913: 295 (preoccupied by *Pseudodinia nitida* (Wulp) 1867: 160, McAlpine 1965: 708); not *Pseudodinia nitens* (Melander and Spuler) 1917: 70, McAlpine 1965: 708.

Pseudodinia nitida; Malloch 1915: 152; Malloch 1921: 347; Malloch 1940: 269 (in part); Hennig 1941: 64.

Description. Body length 1.8-2.7 mm. Density of pruinosity reduced, usually appearing shiny black. Tarsi, knees usually, and apical 0.2-0.3 of tibiae yellow. Frons and vertex entirely bare, rarely with sparse pruinosity within ocellar triangle. Parafacial bare; gena bare to lightly pruinose; face lightly pruinose medioventrally, increasing in density laterally and dorsally toward heavily pruinose lunule. Occiput and oral margin pruinose. Antenna usually entirely black, scape and pedicel sometimes brown. Palp black. Thorax lightly pruinose, heaviest laterally especially along notopleural suture; notum usually very shiny. Wing hyaline to slightly infuscate. Abdomen of male with dorsal wedge of pruinosity extending broadly across tergites 1-3, and at least halfway across tergite 4 as a narrow strip; more often extending broadly to apex of tergite 4; tergite 5 entirely bare, sometimes with basal pruinosity slightly widened medially; successively larger sublateral bare areas on tergites 2-5. Of female, tergite 4 almost entirely bare with basal pruinosity slightly widened medially, rarely with narrow median strip continuing to apex; tergite 5 bare.

Head. Height 1.2-1.4X length; width 1.7-2.0X length. Height of compound eye

1.0-1.1X length, 4.2-6.2X genal width. Frontal width 1.1-1.3X length. Upper orbital seta 0.8-1.0X length of inner vertical seta, arising at 0.1-0.3 of frontal length. Lower orbital seta 0.6-0.8X length of upper orbital seta, arising at 0.5-0.6 of frontal length. Ocellar seta 0.7-1.0X length of upper orbital seta. Ocellar setulae in 1-3 pairs. Gena with 4-7 setae. Length of flagellomere 1 0.8-1.0X height, anterodorsally rounded.

Thorax. Katepisternum with one or two setulae anterior to posterodorsal seta. Anterior acrostichal setulae variable, often extending anterior to level of postpronotal seta, usually as strong as following acrostichals.

Male terminalia. Tergite 6 divided medially, length 0.2-0.3X tergite 5; syntergosternite 7+8 0.4-0.5X length of tergite 5. Strap-like sclerite represented by a separate sclerotized area on left anterolateral corner of each of sternites 6 and 7, bearing left sensory setula; that of sternite 7 not extending to spiracle 7. Genitalia as in Fig. 18. Epandrium abruptly narrowing preapically to an acute point, usually medially curved. Paramere and gonopod moderately developed; gonopod bearing two or three setae. Apex of aedeagus, in ventral view, gently rounded, with slight medial emargination; preapical keels well developed.

Type material examined. *Holotype* ♀ (abdomen slide mounted in euparal). U.S.A. **Idaho:** Avon, 26,vii.1912, [Melander?] (USNM).

Other material examined (67 ♂, 58 ♀). CANADA. **Alberta:** McMurray, 30.vii.1953, G.E. Ball, 1 ♂ (BRI); Eisenhower Jct., Banff Nat. Park, 15.vii.1962, K.C. Herrmann, 1 ♀ (BRI). **Manitoba:** Aweme, N. Criddle, 18.vii.1916, 1 ♀ (BRI), 25.vii.1916, 3 ♂ (USNM), 15.viii.1916, 2 ♀ (USNM), 19.vii.1917, 1 ♀ (BRI); Treesbank, N. Criddle, 23.vii.1915, 1 ♂ (USNM), 6.viii.1915, 2 ♀ (BRI), 1 ♀ (USNM); Ninette, 15.vii.1958, J.G. Chillcott, *ex. Betula glandulosa*, 1 ♂ (BRI); Spruce Woods Forest Reserve, 15miN Glenboro, 24.vii.1958, J.G. Chillcott, 1 ♂ (BRI). **Northwest Territories:** Norman Wells, G.E. Shewell, 2.vii.1969, 1 ♂, 8.vii.1969, 1 ♂ (BRI); Yellowknife, 18.viii.1949, R.R. Hall, 1 ♂ (BRI). **Ontario:** Hamilton, M. Sanborne, Malaise trap, 15-20.vi.1980, 2 ♂, 2 ♀ (UAT), 28.vi.1980, 2 ♂, 10-13.vii.1980, 2 ♂ (GUE), 13-19.vii.1980, 2 ♂, 2 ♀ (CAS), 2 ♂ (GUE), 31.vii.1980, 1 ♂, 1.viii.1980, 2 ♂ (GUE); Windsor, Ojibway Prairie Reserve, 18.vi.1980, S. Beierl, 3 ♂, 2 ♀, 11.vi.1981, K.N. Barber, 1 ♂ (GUE); Windsor [edge of Ojibway Prairie Reserve], S.A. Marshall, Malaise trap, 3-7.vi.1982, 1 ♂, 8-14.vi.1983, 2 ♂, 14-21.vi.1982, 1 ♂ (GUE); Georgian Bay Island 421, 15.viii.1963, J.P. Bogart, 1 ♂ (GUE); Coniston, 26.vii.1915, Parish, 1 ♂, 2 ♀ (USNM); Ogoki, 8.vii.1952, J.B. Wallis, 1 ♂, 1 ♀ (BRI); Osgoode, 22.v.1964, J.R. Vockeroth, 1 ♀ (BRI); Guelph, 1.viii.1976, P.R. Heels, 1 ♀ (GUE); 60miW Hearst, 5.vii.1954, A.H. Sturtevant, 1 ♂ (USNM); Waubamik, 15.vii.1915, J.M. Aldrich, 1 ♀ (USNM). **Quebec:** La Verendrye Prov. Park, 29.vi.1965, D.M. Wood, 1 ♀ (BRI); Bonaventure Is., 25.vii.1954, G.P. Holland, gull nest, 1 ♀ (BRI); Old Chelsea, Summit King Mt., 1150′, J.R. Vockeroth, 25.v.1960, 1 ♂, 2 ♀, 13.vi.1961, 1 ♀, 16.vi.1961, 1 ♂, 25.v.1964, 3 ♂, 1 ♀, 26.v.1964, 1 ♂, 1 ♀, 4.vi.1964, 1 ♂, 8.vi.1964, 2 ♂, 7.vi.1965, 2 ♂, 16.vi.1971, 2 ♂, 1 ♀, 16.vi.1961, 1 ♀ [with J.G. Chillcott's label] (BRI); Summit King Mt., 13.vi.1980, K.N. Barber, 2 ♂ (GUE). **Saskatchewan:** Attons Lake, 21.viii.1940, A.R. Brooks, 1 ♂ (BRI); Indian Head, K. Stewart, 7.viii.1929, 1 ♂, 1 ♀, 27.vii.1929, 1 ♀ (BRI); Big River, 5.vii.1959, A&J. Brooks, 1 ♀ (BRI). **Yukon Territory:** Dawson, W.W. Judd, 1.vii.1949, 1 ♂, 1 ♀, 17.vii.1949, 1 ♀ (BRI). U.S.A. **Colorado:** Clear Cr. Co., West Chicago Cr., 9800′, 11.viii,1961, S.M. Clark, 1 ♂ (BRI); 5miSW Idaho Springs, 27.vii.1961, 8600′, C.H. Mann, 1 ♂, 1 ♀ (BRI). **Illinois:** Urbana, 3.ix.1916, [no collector], 1 ♂ (INHS); Urbana, 30.viii.1914, dredge ditch, [J.R. Malloch], 1 ♀ (INHS); White Heath, 11.vii.1915, [no collector], 1 ♀ (INHS); Chicago, [no date], A.L. Melander Collection, 1 ♀ (USNM). **Indiana:** LaFayette, J.M. Aldrich, 10.v.1915, swept from grass, 4 ♂, 12.v.1915, 1 ♀, 2.vii.1915, 1 ♂, 16.vii.1915, 1 ♂, 1 ♀, 12.vii.[1915?], 1 ♀, 18.viii.1916, 1 ♀, 7.v.1918, 1 ♂ (USNM). **Iowa:** 1miS Amana, 13.viii.1927, G.O. Hendrickson, 1 ♂ (ISU); Boone Co., Ledges St. Park, 19.v.1954, Warters & Malcom, 1 ♀ (UMIN). **Massachusetts:** Woods Hole, "[5 or S].5.50", A.H. Sturtevant Collection, 1 ♂ (USNM). **Minnesota:** Carlton, 10.vi.1934, D. Denning, 1 ♀ (UMIN). **Montana:** Lake McDonald, Glacier Park, 14.viii.1916, A.L. Melander, 1 ♂, 1 ♀ (USNM). **New Hampshire:** Rockingham Co., Rye, 31.vii.1979, J.F. Burger, 3 ♀ (UNHD). **New York:** Franklin Co., Paul Smiths, 20.vii.1962, J.R. Vockeroth, 1 ♂ (BRI); Lake Placid, 2000′, 19.vii.1962, J.R. Vockeroth, 1 ♀ (BRI); Lake George, 26.vii.1929, A.L. Melander, 1 ♀ (USNM). **South Dakota:** Waubay, 6.vi.1918, J.M. Aldrich, 1 ♂, 1 ♀ (USNM); Aberdeen, 29.v.1916, J.M. Aldrich, 1 ♀ (USNM). **Vermont:** St. Albans, 21.vi.[?], C.W. Johnson, 1 ♂ (MCZ). **Wyoming:** Park Co., Pahaska Teepee, 6800′, 24.viii.1979, riverside meadow and pine forest, S&J. Peck [Malaise trap], 2 ♂, 2 ♀ (GUE).

Remarks. *Pseudodinia melanitida* can be distinguished from all other species in the east and midwest by its predominantly shiny black appearance. At its western distributional

limits, *P. melanitida* usually can be separated from shiny forms of *P. varipes* by its more extensively bare gena and parafacial, and by its uniformly dark flagellomere 1 which lacks any indication of an anterodorsal angle. *Pseudodinia occidentalis* differs by often having more extensive yellow on the tibiae but examination of the male genitalia is required for positive identification. Shiny forms of *P. pruinosa* require examination of the male genitalia as well, to confirm that the aedeagus and epandrial apices are not as described above for *P. melanitida. Pseudodinia slussi* is apparently allopatric with *P. melanitida* while *P. latiphallis* is both allopatric and more extensively pruinose.

The holotype female has been placed here mainly because it is not as similar to other shiny western species, despite being somewhat beyond the known distributional range of the more confidently identified males. The slide mounted abdomen has the dorsal pruinosity extending medially onto the basal third of tergite 4. The acrostichal and postpronotal setulae are not stongly developed so this specimen is less likely referrable to *P. occidentalis* in which these are usually strong. Because the antenna does not have an anterodorsal angle and is unicolourous, the holotype is not likely a shiny form of *P. varipes*.

Pseudodinia melanitida is not readily confused with the very pruinose P. nitens, especially when considering details of the male genitalia (Figs. 18, 30). Specimens of *P. melanitida*, and in fact shiny specimens of several species, have in the past been called *P. nitens* (see "Remarks" under that species). Malloch (1940) listed two additional specimens from Idaho and Alberta under the name *P. nitida* Melander, but these are referred to *P. occidentalis* and *P. pruinosa*, respectively.

Variation. There are a few eastern specimens with one or two protpronotal setulae that are strengthened to about half the length of the postpronotal seta. This condition has also been observed in three specimens of *P. pruinosa* from Arizona. Otherwise, the anterior acrostichal and postpronotal setulae are often of similar strength to the more posterior acrostichals, as in *P. occidentalis.*

Distribution (Fig. 68). *Pseudodinia melanitida* is widely distributed from eastern Quebec to the Yukon Territory, south to Indiana and Colorado. It is absent from the southeastern and extreme western and southwestern United States. This is the most northerly recorded species (although one female from Alaska may belong to *P. pruinosa*).

Biology. Ecological observations in Ontario suggest that *P. melanitida* is ecologically distinct from sympatric populations of *P. antennalis, P. pruinosa,* and *P. varipes*. No specific grass or mealybug associations were discovered (Barber 1984). The reference to a gull nest on the label below the specimen from Bonaventure Island, Quebec, likely represents only a fortuitous collection, although gulls are known to line their nests with grasses (Godfrey 1976).

Etymology. From the Latin *melan-* and *nitidus* meaning "black" and "shining", respectively, the specific epithet *melanitida* refers to the general appearance of this species. This name is also a combination of *Mela*nder and his preoccupied name, *nitida.*

Pseudodinia varipes Coquillett
Figs. 19-21, 67.

Pseudodinia varipes Coquillett, 1902: 187; not *Pseudodinia pruinosa* Melander 1913: 295, Malloch 1940: 269 and McAlpine 1965: 708, notwithstanding.

Pseudodinia varipes; (type material only) Melander 1913: 295; Malloch 1921: 347; Malloch 1940: 269; McAlpine 1960: 53; McAlpine 1965: 708.

Description. Body length 1.8-2.7 mm. Colour varying from predominantly shiny black to grey pruinose. Palp and antenna brown to black; scape and pedicel sometimes paler. Knees, tarsi, and apical 0.2-0.3 of tibiae yellow; tarsomeres 2-5 sometimes gradually darkened apically. Ocellar triangle and lateral extremities of vertex often pruinose. Frons entirely bare with anterior extension of bare area onto parafacial, usually to half height of

face, rarely with parafacial entirely bare. Gena predominantly pruinose; sometimes anteromedially bare, rarely almost entirely bare. Head otherwise lightly pruinose. Thorax and dark parts of legs pruinose, often lightly so, appearing shiny. Wing hyaline. Abdomen of male with dorsal wedge of pruinosity extending broadly across tergites 1-3 and sometimes basally on tergite 4, continuing as a narrow, medial strip a variable distance across tergite 4; tergite 5 occasionally with basal strip slightly widened medially. Sublateral bare areas present on tergites 2-5 or 3-5 leaving tergite 4 largely, and tergite 5 almost entirely, bare. Of female, with sublateral bare areas somewhat larger, leaving wedge of pruinosity extending no more than about 0.7 of tergite 4.

Head. Height 1.2-1.4X length; width 1.6-2.0X length. Height of compound eye 0.9-1.0X length, 3.8-5.9X genal width. Frontal width 1.1-1.3X length. Upper orbital seta 0.7-1.0X inner vertical seta, arising at 0.1-0.3 of frontal length. Lower orbital seta 0.6-0.9X length of upper orbital seta, arising at 0.5-0.6 of frontal length. Ocellar seta 0.7-1.0X length of upper orbital seta. Ocellar setulae in one or two pairs. Gena with 4-8 setae. Length of flagellomere 1 often 1.0-1.1X height, usually with an anterodorsal angulation (Fig. 20c, most western specimens); can be 0.8-1.0X height and apically rounded (Figs. 19c, 21c, generalized condition for genus).

Thorax. Katepisternum with two setulae anterior to posterodorsal seta. Anterior acrostichal setulae variable, if extending anterior to level of postpronotal seta, then usually weaker than following acrostichals.

Male terminalia. Tergite 6 divided medially (except specimen from Creston, B.C.), length 0.2-0.3X tergite 5; syntergosternite 7+8 0.4X length of tergite 5. Strap-like sclerite represented by a separate sclerotized area on left anterolateral corner of each of sternites 6 and 7, usually bearing the left sensory setula; that of sternite 7 sometimes extending posteriorly to encircle spiracle 7. Genitalia as in Figs. 19-21. Epandruim with anteroventral margin nearly straight to moderately concave when viewed laterally. Usually with paramere relatively short and gonopod relatively elongate (Fig. 20), bearing two or three setae, but sometimes with paramere moderately long and gonopod variable (Figs. 19, 21). Aedeagus, in lateral view, gradually curved; in ventral view, variably narrowing preapically giving a rounded (not truncate) apex with slight emargination; preapical keels well developed and median trough moderately so.

Type material examined. *Holotype* ♂ (dissected). U.S.A. **New Mexico:** Las Vegas Hot Springs, 3.viii.[1901], H.S. Barber, Type No. 6651 (USNM). *Paratypes* (2 ♀, USNM). Same data as holotype except for the following dates: 8.viii.[1901], and 15.viii.1901 (abdomen missing, not seen, presumed to be slide mounted at USNM). See discussion under "Variation" regarding association of the type material.

Other material examined (71 ♂, 53 ♀). CANADA. **British Columbia:** 10miE Creston, 31.vii.1980, G. Gibson, sweeps, 1 ♂ (BRI); Robson, H.R. Foxlee, 22.vi.1947, 1 ♂, 3.vii.1947, 1 ♀, 13.vii.1947, 1 ♀ (BRI); Kaslo, "16.7", A.N. Caudell, 1 ♀ (USNM); 10miE Osoyoos, 30.vii.1980, G. Gibson, sweeping *Pinus ponderosa* forest meadow, 2 ♂ (BRI). **Ontario:** Windsor, Ojibway Prairie Reserve, K.N. Barber, swept from *Andropogon gerardi* Vit., 11.vii.1980, 1 ♀, 18.viii.1980, 1 ♂ (GUE), 21.vii.1981, 23 ♂, 15 ♀ (GUE), 10♂, 10 ♀ (BRI), 5 ♂, 5 ♀ (USNM), 3 ♂, 2 ♀ (UAT), 2 ♂, 2 ♀ (CAS), 12.vii.1982, 6 ♂, 7 ♀, 18.viii.1983, 2 ♂ (GUE); Ojibway Prairie Reserve, K.N. Barber, reared from eggs of females collected 21.vii.1981, fed on *Trionymus winnemucae* McKenzie, 2 ♀ (GUE); Windsor [edge of Ojibway Prairie Res.], 9-16.viii.1982, S.A. Marshall, Malaise trap, 1 ♂ (GUE). U.S.A. **California:** Shasta Springs, [?].vii.1915, A.L. Melander, 1 ♂ (USNM). **Idaho:** Oneida Co., Black Pine Canyon, 5800′, 12-25.vi.1974, [no collector] Malaise trap, 1 ♂, 3 ♀ (USU); Oneida Co., Rock Creek, 17.vii.1972, G.F. Knowlton, 1 ♂ (USU); Elmore Co., 11miS Pine, 22.vi.1977, W.F. Barr, 1 ♂ (UIM). **Montana:** Ravalli Co., 6miSE Hamilton, 3950′, 13.vii.1973, C. Musgrave, 1 (OSU). **Nevada:** Harrison Pass, 25.vi.1953, A.B. Gurney, 1 ♂ (USNM); Angel Lake, 12miSW Wells, 8400′, 11.vii.1961, B.H. Poole, 1 ♂ (BRI). **Oregon:** Crook Co., 8miSE Prineville, 19.vi.1970, Oman, 1 ♂ (OSU). **Utah:** Cache Co., Rock Creek, 22.vii.1976, W.J. Hanson, 1 ♂ (USU); Cache Co., Logan Canyon, China Row, 10.viii.1979, G.F. Knowlton, 1 ♂ (USU); Cache Co., Green Canyon, W.J. Hanson, 2-10.viii.1973, 1 ♀, 25-31.vii.1968, Malaise trap, 1 ♂, 2 ♀ (USU). **Washington:** Kamiac Butte, 25.viii.1914, A.L. Melander Collection, 1 ♂ (USNM); Colton, C.C. Shelton, virgin prairie population study project, 9.vii.1948, plot #9, 1 ♀, 24.vii.1948, plot #8, 1 ♂ (WSUP).

Remarks. The use of the name *P. varipes* is restricted to a relatively rare but widely distributed species or species complex (see "Variation" below). All specimens share a gradually curved aedeagus when viewed laterally (Figs. 19a-21a), similar to that of *P. latiphallis* (Fig. 22a).

The keys provided by Melander (1913) and Malloch (1921) use frontal dimensions and diverging apices of "third and fourth veins" to distinguish *P. varipes* from *P. melanitida* (as *P. nitida* Melander) and *P. pruinosa*. This is both misleading and inaccurate since the type material, the only specimens available at the time, does not differ substantially from most other species in these characteristics.

Pseudodina varipes is often difficult to recognize on the external characters alone due to the variable density of pruinosity. Those specimens with a much reduced pruinosity usually have the anterodorsal corner of flagellomere 1 angular and the scape and pedicel paler in colour. The shortened paramere and elongate gonopod assist in recognizing these specimens. The gradually curved aedeagus, in lateral view, is a character shared only by *P. latiphallis* which has a considerably wider aedeagus and the epandrial apices deflected posteriorly. The more heavily pruinose, disjunct population from Ontario can be separated from the sympatric populations of *P. pruinosa* by the usually predominantly pruinose gena and parafacial in *P. varipes,* and the aedeagal characters as above.

Variation. This is a fairly variable species as illustrated by the three variants of male genitalia (Figs. 19-21), and might, in fact, be a complex of several sibling species. Most of the western male specimens have genitalia similar to those of the specimen from Creston, B.C., (Fig. 20), with a relatively short paramere and a well developed gonopod. The aedeagal width, in ventral view, varies considerably, with some as narrow as that of the holotype (Fig. 19b), and others nearly as wide as that in Fig. 21b (disjunct Ontario population). As well, these typical western specimens are usually quite shiny and have the length of flagellomere 1 1.0-1.1X the height, with the anterodorsal aspect usually quite angular (Fig. 20c). The shorter flagellomere 1 is nearly rounded anterodorsally and the scape and pedicel are usually pale brown to yellow in these shiny western specimens.

The holotype, and the specimens from Harrison Pass, Nevada, and Ontario, exhibit the generalized conditions (for the genus) of flagellomere 1, i.e. length 0.8-1.0X height and anterodorsally rounded (Figs. 19c, 21c). They have a relatively elongate paramere and poorly developed gonopod (Figs. 19, 21). In addition, the holotype and the specimen from Harrison Pass have the parafacial and gena more extensively bare and the thorax slightly more pruinose than most other western specimens. The specimens from Ontario have the most pruinose thoraces and the widest aedeagi, although the narrowest among them are comparable to some western specimens.

One of the specimens from Robson, B.C., possesses an elongate gonopod, and a long, angular flagellomere 1, but an elongate paramere. The other specimen is easily placed here, having the more prevalent western condition of all three structures. The two specimens from Osoyoos possess a long paramere, a short gonopod, and an elongate but rounded flagellomere 1.

It has been determined that the pruinose population of *P. varipes* in Ontario is ecologically distinct from the sympatric population of *P. pruinosa* (Barber 1984). The genitalia are quite distinct (Figs. 21, 26) and specimens of *P. pruinosa* in Ontario have entirely bare parafacials and genae while these areas are predominantly pruinose in the sympatric *P. varipes* specimens. It is quite unlikely that these are conspecific variants (see "Biology" below).

Until more biological information is gathered for the western populations and more sampling is conducted in the wide geographic area separating these populations from that in Ontario, all are considered variants of *P. varipes.* This is in spite of the fact that the holotype is at the extreme of the range of variation of males in the extent of the bare areas on the gena and parafacial, and the gena is the widest measured in proportion to the eye height (eye/ gena=3.8). The female paratypes are somewhat shinier than the holotype and their genae and parafacials are entirely bare. Although these are associated with the male,

it is not entirely certain that they are properly associated.

The specimen from Harrison Pass has the lower orbital setae distinctly proclinate. This is the only known occurrence of proclinate orbitals within the family Chamaemyiidae. The specimen from Creston has tergite 6 undivided medially, a specific character for *P. nigritarsis* and *P. cinerea*. A single specimen of *P. occidentalis* has this tergite only slightly emarginate anteromedially. These conditions are considered anomalous in *P. varipes* and *P. occidentalis*.

Distribution (Fig. 67). Principally a western species, *P. varipes* is known from southern British Columbia south to northern California, Nevada, and New Mexico, with an apparently disjunct population in Ontario.

Biology. Specimens of the population in Ontario are associated with the grass *Andropogon gerardi* Vitman. A mealybug, *Trionymus* sp., is known to infest this grass at another locality in Ontario (Barber 1984). This disjunct population is sympatric with *P. antennalis, P. melanitida,* and *P. pruinosa*, but it is evidently ecologically distinct from the latter two species by its plant association. This is not so with *P. antennalis* which is also associated with *A. gerardi*. Several western specimens of *P. varipes* were also taken with *P. pruinosa*, but their host associations are unknown.

Laboratory rearings of two adult females from eggs obtained from field-collected females, suggest a physiological difference between *P. varipes* and *P. pruinosa* (Barber 1984). Larvae of both species were fed specimens of the same mealybug species, *T. winnemucae* McKenzie, the natural host of *P. pruinosa* in Ontario, but the developmental time was considerably longer in *P. varipes*. This biological information supports the morphological evidence that these are two distinct species.

Pseudodinia occidentalis new species

Figs. 23-24, 68.

Pseudodinia nitida; Malloch 1940: 269, in part; not *Pseudodinia nitida* Melander 1913: 295.

Description. Body length 2.0-3.2 mm. Pruinosity reduced, colour ranging from shiny black to lightly grey. Palp and antenna brown to black; scape, pedicel, and base of flagellomere 1 sometimes lighter. Knees, tarsomere 1, and apical 0.2-0.5 of tibiae yellow; tarsomeres 2-5 yellow or gradually darkening apically. Vertex, ocellar triangle, and frons entirely bare. Parafacial and gena bare to lightly pruinose. Head otherwise lightly pruinose. Thorax and dark parts of legs very lightly to moderately pruinose, usually appearing shiny. Wing hyaline to lightly infuscate. Abdomen of male with dorsal wedge of pruinosity extending broadly across tergites 1-3, and a narrow median strip variably extending across tergite 4, at most the full length; successively larger sublateral bare areas present on tergites 2-5 or 3-5, leaving tergite 4 mostly, and tergite 5 essentially bare. Of female, with sublateral bare areas sometimes slightly more extensive.

Head. Height 1.1-1.3X length; width 1.5-2.0X length. Height of compound eye 0.9-1.1X length, 4.2-6.2X genal width. Frontal width 1.1-1.4X length. Upper orbital seta 0.8-1.0X length of inner vertical seta, arising at 0.1-0.2 of frontal length. Lower orbital seta 0.6-1.0X length of upper orbital seta, arising at 0.5-0.6 of frontal length. Ocellar seta 0.8-1.1X length of upper orbital seta. Ocellar setulae in one or two pairs. Gena with 5-10 genal setae. Length of flagellomere 1 0.8-1.0X height, anterodorsally rounded.

Thorax. Katepisternum with two setulae anterior to posterodorsal seta. Anterior acrostichal setulae usually extending anterior to level of postpronotal seta, usually subequal in strength to following acrostichals.

Male terminalia. Tergite 6 divided medially (except specimen from Wyoming in which it is incompletely divided), length 0.2-0.3X tergite 5; syntergosternite 7+8 0.4-0.5X length of tergite 5. Strap-like sclerite represented by a separate, indistinctly sclerotized area on left, anterolateral corner of each of sternites 6 and 7, usually bearing the left sensory setula; that

of sternite 7 sometimes extending posteriorly to encircle spiracle 7. Genitalia as in Figs. 23-24. Epandrial apices relatively broadly rounded. Paramere moderately long. Gonopod short to moderately developed, bearing two or three setae. Aedeagus, in lateral view, relatively thick throughout its length; in ventral view, apex usually widely truncate with shallow emargination, well defined median trough, and low, preapical keels.

Type material examined. *Holotype* ♂ (not dissected). U.S.A. **Arizona:** Pima Co., Quinlan Mts., Kitt Peak, 6875′, 17.v.1975, T.P.Sluss (USNM; courtesy of UAT). *Paratypes* (147 ♂, 108 ♀). CANADA. **British Columbia:** Penticton, 3.viii.1967, J.R.Vockeroth, 7♂, 3♀ (BRI); Terrace, 31.v.1960, R.J. Pilfrey, 1♂, 8.vi.1960, J.G.Chillcott, along railroad, 1♀ (BRI); 32miSW Terrace, 9.vii.1960, C.H.Mann, 1♂ (BRI). U.S.A. **Arizona:** same data as holotype, 5♂, 9♀ (UAT), 5♂, 5♀ (BRI), 5♂, 5♀ (USNM); same data as holotype but with the following dates, 4.viii.1977, 5♂, 2♀, 12.viii.1977, 4♂, 4♀ (UAT); Cochise Co., Chiricahua Mts., S.W.R.S., 8.ix.1970, T.P.Sluss, 5♂, 3♀ (UAT); S.W.R.S., 5400′, 30.iv.1979, K.N.Barber, 3♂, 3♀ (GUE); S.W.R.S., 5miW Portal, 5400′, 5.viii.1971, P.O.Ritcher, 2♀ (OSU); S.W.R.S., P.H.Arnaud, Jr., 24.ix.1966, 1♂, 1♀, 25.ix.1966, 1♂ (CAS); S.W.R.S., 5.vii.1963, J.G.Rozen, D.K.Oliver, A.R.Moldenke, J.A.Woods, 1♂ (AMNH); S.W.R.S., 3.viii.1966, D.R.Miller, 1♀ (UCD); Apache Co., Alpine Divide Camp, 4miN Alpine, 8500′, 15.vii.1965, F,P&M.Rindge, 1♂ (AMNH). **California:** Mt. San Jacinto, 10.v.1935, A.L.Melander, 30♂, 12♀ (USNM); Victorville, 16.v.1955, W.R.M.Mason, 6♂, 14♀ (BRI); Pacific Grove, A.H.Sturtevant Collection, 21.v.1920, 2♂, 13-30.vi.1920, 1♂, 2♀, 8-23.viii.1920, 1♂, 20.viii.1920, 1♂ (USNM); Valyermo, 13.v.1944, A.L.Melander, 1♂, 2♀ (USNM); Mt. Home Can., 13.v.1947, A.L.Melander, 1♂, 2♀ (USNM); Nevada Co., Truckee River, 4.5miE Truckee, Hwy. 40, 5600′, 27.viii.1965, H.B.Leech, 1♂ (CAS); Kern Co., Onyx, 25.iv.1950, E.I.Schlinger, 2♂ (UCD); Onyx, 23.vii.1940, R.H.Beamer, 1♂ (UKL); Inyo Co., S. edge Lone Pine, 17.vi.1962, J. Tomlinson, roadside weeds and grasses, 1♀ (CAS); Inyo Co., Lone Pine, 9.vi.1929, R.L.Usinger, 1♂ (CAS); Plumas Co., Mt. Ingalls, 11.vii.1964, [no collector], 1♀ (UCD); Plumas Co., Clio, 9.vii.1916, H.G.Dyar, 2♂ (USNM); Camp Angelus, 2.vi.1947, A.L.Melander, "Wh Ceanothus", 1♂ (USNM); Crestline, 13.vii.1944, A.L.Melander, 1♂ (USNM); Contra Costa Co., Antioch, 18.x.1936, R.C.Dickson, 1♂ (UCR); Antioch, 25.vi.1947, A.L.Melander, 1♂ (USNM); Felton, St. Cruz Mts., 20-25.v.1907, 300-500′, Bradley, 1♂ (CUI), 1♀ (PSU); Napa Co., 2miS Spanish Flat, 29.vi.1961, R.O.Schuster, 1♀ (UCD); Napa Co., St. Helena, 3.vi.1909, C.Fuchs, 1♂ (ANSP); Alameda Co., Berkeley Hills, 20.iv.1908, [no collector], 1♂ (ANSP); Alameda Co., Tesla, 21.ix.1951, W.C.Bentinck, 3♂, 1♀ (UCB); Solano Co., Solano Lake, 24.iv.1970, B.L.Villegas, 1♂, 1♀ (UCD); Palo Alto, 10.vi.1921, A.H.Sturtevant Collection, 1♀ (USNM); Pasadena, [?].v.1952, A.H.Sturtevant Collection, 1♀ (USNM); Pescadro [Pescadero], 16.viii.1951, A.H.Sturtevant Collection, 1♀ (USNM); Barton Flat, So. Fork Camp, 2.ix.1944, A.L.Melander, 1♀ (USNM); Helendale, 18.v.1953, W.R.Richards, 1♀ (BRI); S. Fks. Sta. Ana [River], A.L.Melander, 2.viii.1942, 1♀, 17.vi.1945, 1♀, 18.vi.1945, 2♀ (USNM); Up Sta. Ana R., 11.viii.1948, A.L.Melander, 1♀ (USNM); Nevada Co., Sagehen Ck., 23.vii.1968, D.S.Horning, Jr., 1♀ (UCD); Yolo Co., Davis, 20.vi.1966, C.R.Kovacic, 2♀ (UCD); El Dorado Co., Freds Place, 10.vii.1967, R.O.Schuster, 1♀ (UCD); San Diego Co., Mt. Palomar, 28.vi.1963, C.H.Frady, 1♀ (OSU); Siskiyou Co., road to Taylor Lake, 5750′, S. of Sawyers Bar-Etna road, 28.vii.1968, H.B.Leech, 1♂ (CAS); Riverside, 5.v.1935, A.L.Melander, 1♂, 2♀ (USNM); Riverside, 7-21.vi.1983, D.Yu, Malaise trap, 1♂ (GUE). **Colorado:** 6miSW Idaho Spring, 27.vii.1961, J.G.Chillcott, 1♂ (BRI); Clear Cr. Co., Chicago Cr., 8800′, 5.viii.1961, B.H.Poole, 2♂, 1♀ (BRI); Jackson Co., Rabbit Ears Pass, 7.vii.1961, J.G.Chillcott, 1♂ (BRI). **Idaho:** Lake Waha, 9.vi.1918, A.L.Melander, 1♂ (USNM); Chatcolet, [?].viii.1915, A.L.Melander, 1♂, 2♀ (USNM); Moscow Mt., 4.vii.1911, A.L.Melander Collection, 1♂ (USNM); Priest Lake, 1.viii.1916, A.L.Melander, 1♂ (USNM); Viola, 26.vi.1912, J.M.Aldrich, 1♂, 1♀ [reported as *P. nitida* Melander by Malloch 1940] (USNM). **Nevada:** Washoe Co., Verdi, 25.vi.1961, F.D.Parker, 1♂ (UCD); Washoe Co., Patrick, 30.vi.1964,

J.A.Froebe, 1 ♂ (UCD); Angel Lake, 12miSW Wells, 8400′, 11.vii.1961, J.G.Chillcott, 2 ♂ (BRI). **New Mexico:** Catron Co., 8miSE Luna, 7500′, 9-14.vii.1979, S&J. Peck, pond. pine at stream, 1 ♂ (GUE); 5miW Luna, 7400′, 9-14.vii.1979, S&J. Peck, San Francisco River, pond. pine meadows, 1 ♂ (GUE). **Utah:** Summit Co., Bear River R.S., 3miSE, 5-12.viii.1971, Hanson & Knowlton, Malaise trap, 4 ♂ , 2 ♀ (USU); Summit Co., Henrys Fork Camp, 1-10.viii.1979, 9600′, S&J. Peck, pine aspen at stream, carrion Malaise trap, 1 ♂ (GUE); Grand Co., 10miSE Moab, 30.v.1974, Knowlton & Hanson, 1 ♂ (USU); San Juan Co., Pack Ck. C.G., La Sal Mts., 3.vi.1977, Hanson & Knowlton, 1 ♀ (USU); Cache Co., Blacksmith Fork Can., 3.vii.1971, G.F.Knowlton, 1 ♂ (OSU); Cache Co., Green Canyon, 2-10.viii.1973, W.J.Hanson, Malaise trap, 2 ♂ , 5 ♀ (USU); Cache Co., Tony Grove Canyon, 7800′, 1-7.viii.1975, Knowlton & Hanson, Malaise trap, 1 ♂ (USU); Cache Co., Mendon Cold Spg., 20.vi-4.vii.1977, 11-17.viii.1977, [no collector], Malaise trap, 2 ♂ (USU); Cache Jct., 20.vi.1913, H.R.Hagan, 1 ♂ (AMNH); Franklin Basin, 21.vii.1967, G.F.Knowlton, 1♂ (USU). **Washington:** Mica, 14.vii.1918, A.L.Melander, 1♂ , 2♀ (USNM); Copalis, 26.viii.1951, A.H.Sturtevant Collection, 1♂ (USNM); Valleyford, 19.vi.1919, A.L.Melander, 1 ♂ (USNM); Seattle, 2.viii.1908, A.L.Melander Collection, 1 ♂ (USNM); Lowden, 22.vi.1921, A.L.Melander, 1 ♂ (USNM); Holland, 5.vii.1919, A.L.Melander, 2 ♂ (USNM). **Wyoming:** North Fork Sibylee Cr. nr. Wheatland, 16.viii.1940, H.E.Milliron, 1 ♂ (UMIN).

Remarks. The male genitalia of the typical populations from Arizona and California are virtually indistinguishable and this similarity has led to the inclusion of these forms in one rather bimodally variable species (see "Variation" below). Figures 23-24 show extremes in epandrial and aedeagal proportions and should not be considered specific to the respective populations. The holotype was selected from the population in Arizona since it is more readily distinguished from all other species and is known to be sympatric with several species, including the highly variable *P. pruinosa.*

Pseudodinia occidentalis is sometimes difficult to distinguish from some other species with a bare frons. All Arizona specimens (and four others, see "Variation" below) have the genal setae relatively thickened. Most specimens have the anterior acrostichals extending anterior to the level of the postpronotal seta and are of subequal strength to the following acrostichals. This latter character, combined with the usually wide aedeagal apex and reduced notal pruinosity, serves to distinguish this species from *P. pruinosa* as indicated in the key. *Pseudodinia occidentalis* can be distinguished from *P. melanitida* by its wider epandrial apices and the usually wider aedeagus.

The characters given above should be used to supplement those given in the key. In addition, the extensively yellow tibiae (apical 0.3-0.5), especially on the foreleg, assist in recognizing this species. Malloch (1940) determined the male specimen from Viola, Idaho, as *P. nitida* Melander.

Variation. Specimens from the rather singular populations from Arizona have thickened genal setae, which are subequal in strength to the postgenals. These specimens also have the parafacial and gena more extensively bare and the wings are hyaline.

The specimens outside of Arizona (except the four specimens from Catron Co., New Mexico, Moab, Utah, and Pack Creek, Utah) have unmodified genal setae and the wing is lightly infuscate in the specimens from the west coast states and British Columbia. The more easterly specimens are variable in the expression of wing infuscation.

As mentioned previously, the specimen from Wyoming has tergite 6 only basally emarginate, not entirely divided. One other dissection has a supernumerary seta near the lateral base of the right paramere (see Fig. 33b). Both conditions are considered anomalous in this species.

Distribution (Fig. 68). *Pseudodinia occidentalis* ranges widely in western North America, from British Columbia to California and New Mexico.

Biology. Few data are available. Melander's specimen from Camp Angelus, California,

bears a collection label referring to *Ceanothus* (Rhamnaceae), but probably only suggests the type of habitat as rocky hills [as per *C. sanguineus* Pursh in Gleason and Cronquist (1963)] and not an association with this shrub. One of the specimens from Lone Pine, California, was taken in roadside weeds and grasses, which is very similar to the type of habitat where other *Pseudodinia* species have been found.

Etymology. From the Latin *occidens* meaning "west", the specific epithet *occidentalis* refers to the western distribution of this species.

Pseudodinia pruinosa Melander

Figs. 3, 5, 7, 10, 12, 25-29, 38-41, 44-65, 69. Table I.

Pseudodinia pruinosa Melander, 1913: 295.
Pseudodinia pruinosa; Malloch 1921: 347.
Pseudodinia nitida; Malloch 1940: 269, in part; not *Pseudodinia nitida* Melander 1913: 295.
Pseudodinia antennalis; in part, Malloch 1940: 269 (two paratypes).
Pseudodinia varipes; in part, Malloch 1940: 269, McAlpine 1965: 708; not Coquillett 1902: 187.

Description. Body length 1.9-3.1 mm. Pruinosity variable, colour ranging from relatively shiny black to densely grey. Antenna and palp usually brown to black, rarely with scape, pedicel, and palp paler brown to yellow. Knees black to yellow, tarsomere 1, and apical 0.2-0.4 of tibiae (sometimes entirely black dorsally) yellow; tarsomeres 2-5 sometimes darkened to brown or black. Frons, vertex, and ocellar triangle ranging from entirely bare to transversely pruinose in a solid band to level of upper orbital seta. Parafacial and gena bare to pruinose. Head otherwise lightly pruinose. Thorax and dark parts of legs lightly to moderately pruinose. Wing hyaline. Abdomen of male with dorsal wedge of pruinosity extending broadly across tergites 1-3, and often more narrowly across a variable or entire length of tergite 4; successively larger sublateral bare areas (Fig. 47) present on tergites 2-5 or 3-5 (Fig. 47) leaving tergite 4 largely, and tergite 5 entirely, bare. Of female, with sublateral bare areas slightly larger and dorsal pruinosity extending narrowly to no more than basal third of tergite 4 leaving tergite 4 largely to entirely, and tergite 5 entirely bare.

Head (Figs. 3, 44, 46). Height 1.1-1.4X length; width 1.6-2.0X length. Height of compound eye 0.8-1.1X length, 4.0-6.1X genal width. Frontal width 1.0-1.3X length. Upper orbital seta 0.7-1.1X length of inner vertical seta, arising at 0.1-0.3 of frontal length. Lower orbital seta 0.4-0.7X length of upper orbital seta, arising at 0.4-0.6 of frontal length. Ocellar seta 0.7-1.0X length of upper orbital seta. Ocellar setulae in one or two pairs. Gena with 3-7 setae. Length of flagellomere 1 0.8-1.0X height; usually anterodorsally rounded, rarely with very slight preapical angulation.

Thorax (Figs. 5, 7). Katepisternum with 1-4 setulae anterior to posterodorsal seta. Anterior acrostichal setulae variable, usually not extending anterior to level of postpronotal seta, but if so, then weaker than following acrostichals.

Male terminalia (Figs. 10, 47). Tergite 6 divided medially, length 0.2-0.3X tergite 5; syntergosternite 7+8 0.3-0.5X length of tergite 5. Strap-like sclerite represented by a separate, lightly sclerotized area on left, anterolateral corner of each of sternites 6 and 7, each usually bearing the left sensory setula; that of sternite 7 sometimes extending posteriorly to encircle spiracle 7. Genitalia as in Figs. 25-29, 45. Epandrium varying from nearly triangular to more elongate. Paramere of moderate length to relatively elongate. Gonopod of variable development, bearing two or three setae. Aedeagus, in lateral view, relatively short to elongate with apex narrow to thick; in ventral view, apex bluntly rounded to truncate, sometimes with slight emargination; preapical keels variably developed; median trough shallow to moderately deep.

Egg (Figs. 48-51). Length 0.7-0.8 mm., greatest width 0.2 mm. White, cylindrical, ends slightly tapering, slightly flattened ventrally (Fig. 48). Surface of chorion with 30-34

parallel, longitudinal, anastomosing ridges which are weaker ventrally. Cross ridges predominantly weakly developed, but strongly developed near ends, especially near eclosion cap where they form irregular, rectangular cells. Microsculpture of sides of longitudinal ridges appearing raspberry-like except at carinate apex (Fig. 49). Bottom of inter-ridge trough relatively smooth with small, irregularly arranged aeropyle pores. Micropyle consisting of 12-14 pores (Fig. 50); eclosion cap with 14-17 smaller pores (Fig. 51).

First-instar larva (Figs. 38, 54-59). As in third instar except as follows. Length 0.7-1.7 mm., greatest width 0.2-0.3 mm. Recently hatched specimens with contrasting yellow internal tissue in abdominal segments 5-7. Integument not shagreened in region of creeping welts (Figs. 55, 57).

Head (Fig. 54). Antenna more slender. Maxillary plate with only two marginal sensilla. Cephalopharyngeal skeleton (Fig. 38) about 0.15 mm. long, dark brown; hypopharyngeal sclerite more slender; mandible less pigmented at apex than at base; base not as broadly rounded.

Thorax (Figs. 55-56). Dorsal and ventral creeping welts bearing fewer and shorter ridges; two or three pairs of sensilla dorsolaterally on segments 2-3 in lateral extremities of creeping welts. Metapneustic, anterior spiracles absent.

Abdomen (Figs. 57, 59). Dorsal creeping welts of segment 1 with some short ridges but by segment 3, all welts bearing discrete spinules; segments 1-7 with three or four pairs of lateral sensilla as in thorax; segment 7 lacking ridges or spinules, with four pairs of lateral sensilla only; segment 8 with one pair of lateral sensilla only. Ventral creeping welts consisting of discrete spinules on segments 1-8, integument apparently not shagreened. Segment 8 with perianal pad also bearing spinules (Fig. 59); two pairs of elongate, peg-like sensilla posterolateral to perianal pad. Posterior spiracular tubes not sclerotized; internal trachea bifurcate, opening as two spiracular slits; spiracular plate also bearing four strong, simple interstigmatal hairs (Fig. 58).

Second-instar larva (Figs. 39, 52). As in third instar except as follows. Length 1.1-2.7 mm., greatest width 0.3-0.4 mm.

Head. Cephalopharyngeal skeleton (Fig. 39) about 0.24 mm. long, dark brown; hypopharyngeal sclerite slightly more slender; mandible less pigmented at apex; base more irregular in outline, not as broadly rounded.

Thorax. Anterior spiracle with four or five papillae.

Abdomen. Only apical half of spiracular tubes sclerotized; spiracular slits and ecdysial scar more prominent (Fig. 52).

Third-instar larva (Figs. 40-41, 53, 60-65). Length 3.6-5.0 mm., greatest width 0.6-0.8 mm., somewhat dorsoventrally flattened, gradually tapering through thorax to head. Abdominal segment 8 slightly narrower than segment 7, posteriorly rounded, bearing a pair of elongate, sclerotized, spiracular tubes dorsolaterally at apex. Thoracic and abdominal segments separated by conspicuous primary integumentary folds isolating intersegmental elliptical areas laterally (Fig. 53); each segment with two, often obscured, secondary integumentary folds. Colour pinkish brown with abundant creamy white fat bodies visible; scattered dark spots laterally; dorsal tracheal trunks conspicuous. Integument transparent, often bearing a dusty white coating in life, readily removed in fluid (presumably of mealybug host origin); predominantly smooth with no spines, papillae, or tubercles, but with scattered plate-like sensilla; ventral and dorsal creeping welts shagreened on areas surrounding patches of ridges on thoracic and abdominal segments (more weakly so dorsally, especially on thoracic segments).

Head. Each antennomaxillary lobe with a two-segmented, papilla-like antenna, dorsolaterally, and a maxillary palp (Figs. 41, 62) consisting of a discrete plate bearing two sensilla, surrounded by four marginal sensilla, two additional sensilla dorsolaterally (a third is indistinct), and an indistinct plate ventrally, bearing one sensillum. Two pairs of sensilla in longitudinal lines, dorsomedial to the maxillary palps. Preoral margin bounded

anterolaterally by papillate sensillum (Fig. 41); laterally produced into spine-like emarginations with lateral sensillum. Labial lobe an elongate tab-like structure. Area posterior to labial lobe bearing posteriorly oriented spines, entire area often retracted with head (Fig. 62). Cephalopharyngeal skeleton (Fig. 40) about 0.31 mm. long, black; tentoropharyngeal sclerite fused anteriorly with hypopharyngeal sclerite, dorsal and ventral cornua tapering apically, lacking windows; lateral rami of hypopharyngeal sclerite broadly fused ventrally at about midlength (Fig. 40b); mandible lightly sclerotized dorsobasally, expanded ventrally to form rounded base.

Thorax. Series of sharp, transverse ridges on creeping welts completely encircling segment 1 (Figs. 60, 63), but only a small number of lateral ridges connecting dorsal and ventral patches on segments 2 and 3. Anterior-most ridges can be broken into spinule-like sections especially dorsally on segment 1. Anterior spiracles (Fig. 61) on posterolateral surface of segment 1 not sclerotized; usually bearing four or five papillae but rarely three or six. Ventral surface of segments 1-3 each with pair of three closely grouped, needle-like sensilla situated submedially, posterior to ridges (Fig. 63); a transverse row of six sensilla anterior to this, and two (segments 2-3) or three (segment 1) larger sensilla more laterally. Dorsal surface of segment 1 with transverse, sinuous row of ten sensilla, the most lateral pair larger, and with two pairs of sensilla posterior to these. Segments 2 and 3 dorsally with row of eight sensilla, the outer pair larger (inner six each appearing to consist of a cluster of 1-3 sensilla using light microscopy but as poorly defined pits using scanning electron microscopy).

Abdomen. Segments 1-8 with discrete dorsal and ventral creeping welts, the ventral welts more extensive on each segment and the dorsal welts lacking on segments 7-8; segments 1-3 or 1-4 with progressively smaller patches of nearly discrete spinule bands (broken ridges) anterior to the ventral creeping welt ridges (similar to thoracic segment 1 dorsally). Ventral surface of segments 1-7 bearing transverse row of six sensilla; a median pair of sensilla immediately posterior to the creeping welts but anterior to the row of six. Segments 1-7 dorsally bearing a transverse row of six sensilla "clusters" and two pairs of posterolateral sensilla "clusters". Segment 8 ventrally with a transverse row of six sensilla anterior to the perianal pad and two pairs of sensilla posterolateral to the perianal pad below the posterior spiracles; dorsally with only the lateral two pairs of sensilla "clusters". Perianal pad broad, oval, and conspicuous, with median, longitudinal anal slit; no associated spinules or sensilla (Fig. 64). Posterior spiracular disc undifferentiated, without marginal lobes; bearing two cylindrical, sclerotized spiracular tubes about twice as long as basal diameter (Fig. 64), with internal trachea trifurcate, opening on spiracular plate as three radially arranged slits (Fig. 65); spiracular plate also bearing an ecdysial scar and four bifurcate, often broken, interstigmatal hairs bordering the slits.

Puparium. Length 2.8-3.8 mm., greatest width 0.7-1.0 mm.; subcylindrical, flattened ventrally, convex dorsally; tapering in anterior fifth and slightly so to abdominal segment 8 which is rounded posteriorly. Integument brown, heavily sclerotized, lateral spots inconspicuous; finely wrinkled, more densely so on thoracic segments and abdominal segments 1 and 8. Integumentary folds of thoracic segments 2-3, and abdominal segments conspicuous. Apex (thoracic segment 1 since head retracted) truncate in dorsal view with sclerotized anterior spiracles projecting from anterolateral aspects above ecdysial suture. Posterior spiracles diverging though bases more approximated than in larva. Perianal pad slightly invaginated. Other fine details as in third-instar larva.

Type material examined. *Holotype* ♂ (dissected). U.S.A. **Texas:** "5.11.0", A.L.Melander Collection (USNM). The holotype is near one extreme in its extensive pruinosity and is discussed further under "Variation".

Other material examined (1179 ♂, 1142 ♀, 7? = sex undetermined). CANADA. **Alberta:** Onefour, 3.vi.1956, E.E.Sterns, 1♂, 1.vi.1956, O.Peck, swept from *Agropyron cristatum,* 1 ♀ (BRI); Onefour, 2.viii.1980, G.Gibson, sweeping, 27♂, 28 ♀ (GUE); 5miW Writing-on-Stone Prov. Pk., Milk River Valley, 15.vii.1980, G.Gibson, sweeping, 19♂, 18 ♀ (GUE); 0.5miE Writing-on-Stone Prov.

Pk., Milk River Valley, 1.viii.1980, G.Gibson, sweeping, 8 ♂, 11 ♀ (GUE); Medicine Hat, [?].x.1911, J.R.Malloch, 1 ♀ [reported as *P. nitida* Melander by Malloch 1940] (USNM); Medicine Hat, 16.vii.1956, O.Peck, swept from *Agropyron cristatum,* 4 ♂, 5 ♀ (BRI); Oyen, 22.vi.1979, D.H.Pengelly, 1 ♂ (GUE); Oldman River, Lethbridge, 22.vi.1956, O.Peck, [some] swept from *Bromus inermis,* 11 ♂, 8 ♀ (BRI); Lethbridge, 5.vii.1956, O.Peck, 3 ♀ (BRI); Elkwater Lake, 21.vii.1956, O. Peck, 2 ♂, 2 ♀ (BRI); Scandia, 9.vii.1956, O.Peck, 1 ♀ (BRI); Gilchrist Ranch, Aden, 28.vi.1956, O.Peck, swept from grass range, 1 ♂, swept from alfalfa and crested wheatgrass, 1 ♀ (BRI). **British Columbia:** Robson, H.R.Foxlee, 13.vii.1947, 2 ♂, 1 ♀, 22.vi.1947, 1 ♂ (BRI); 10miE Osoyoos, 30.vii.1980, G.Gibson, sweeping *Pinus ponderosa* forest meadow, 2 ♂, 2 ♀ (GUE); Okanogan Valley nr. Osoyoos, 10.vii.1980, sage, S.A.Marshall, 1 ♀ (GUE); 5miNW Canal Flats, 17.vii.1970, Oman, 1 ♀ (OSU). **Manitoba:** Treesbank, N.Criddle, 20.vii.1915, 3 ♂, 1 ♀ (USNM), 23.vii.1915, 1 ♂ (INHS), 1 ♀ (USNM), 28.vii.1915, 1 ♀ (INHS), 1 ♂, 3 ♀ (USNM), 6.viii.1915, 3 ♂, 1 ♀ (BRI), 1 ♂ (USNM); Aweme, N. Criddle, 25.vii.1916, 1 ♂, 2 ♀, 1.viii.1916, 1 ♂ (USNM); 2miW Stockton, J.G.Chillcott, 6.viii.1958, 1 ♂, 1 ♀, spruce sand community, 16.vii.1958, 2 ♂, 28.vii.1958, 3 ♂, 2 ♀ (BRI); Bald Head Hills, 13miN Glenboro, 12.vii.1958, J.G.Chillcott, 2 ♂, 6 ♀ (BRI); Bald Head Hills, [Spruce Woods Forest Reserve], 12kmN Glenboro, K.N.Barber, swept from *Schizachyrium scoparium,* 1.viii.1983, 3 ♂, 1 ♀, 4.viii.1983, 1 ♂ (GUE); 5miSW Shilo, 22.vii.1958, J.G.Chillcott, at margin of grain field, 1 ♂ (BRI). **Ontario:** Rondeau Prov. Pk., Rondeau Park, 15.viii.1980, K.N.Barber, swept from *Schizachyrium scoparium,* 25 ♂, 44 ♀ (GUE); Rondeau Prov. Pk., 17.vi. 1983, R.Gadawsky, 2 ♂, 4 ♀ (GUE); Rondeau, 2.vii.1960, D.H.Pengelly, 1 ♂, 1 ♀ (GUE); Pt. Pelee Natl. Pk., Leamington, K.N.Barber, swept from *Schizachyrium scoparium,* 7.vii.1980, 2 ♂, 4 ♀, 9.vii.1980, 2 ♂, 2 ♀, 17-18.viii.1980, 48 ♂, 57 ♀, 1?, 22.vii.1981, 31 ♂, 24 ♀, 1?, 11.vii.1982, 20 ♂, 8 ♀ (GUE); Pt. Pelee, W.Ralley, reared by K.N.Barber from egg of female collected 5.vii.1981, fed on *Trionymus winnemucae,* 1 ♀ (GUE); Pt. Pelee, 19-21.vi.1981, W.Ralley, 3 ♂, 8 ♀ (GUE); Pt. Pelee, 13.vi.1971, D.Krailo, 1 ♀ (GUE); Ojibway Prairie Reserve, Windsor, 21.vii.1981, K.N.Barber, swept from *Schizachyrium scoparium,* 2 ♂ (GUE); Ipperwash Prov. Pk., 14.vii.1980, K.N.Barber, swept from *Schizachyrium scoparium,* 1 ♂, 7 ♀ (GUE); Pinery Prov. Pk., Grand Bend, K.N.Barber, swept from *Schizachyrium scoparium,* 14-15.vii.1980, 21 ♂, 12 ♀, 19.viii.1980, 41 ♂, 33 ♀ (GUE), 11.vii.1981, 112 ♂, 124 ♀ (GUE), 10 ♂, 10 ♀ (UAT), 10 ♂, 10 ♀ (BRI), 10 ♂, 10 ♀ (USNM), 5 ♂, 5 ♀ (LACM), 12.ix.1981, 8 ♂, 4 ♀, 13.vi.1982, 15 ♂, 11 ♀, 15.viii.1982, 47 ♂, 47 ♀, 6.vii.1983, 25 ♂, 8 ♀, 25.viii.1983, 4 ♂, 6 ♀ (GUE), swept from *Andropogon gerardi,* 25.viii.1983, 2 ♀, 19.viii.1984, 1 ♂, 1 ♀ (GUE); Pinery Prov. Pk., K.N.Barber, reared from eggs of females collected 11.vii.1981, fed on *Trionymus winnemucae,* 18 ♂, 17 ♀ (GUE); Pinery Prov. Pk., 13.vii.1979, W.A.Attwater, 1 ♂ (GUE); Pinery Prov. Pk., 6.vii.1983, B.V.Brown, 2 ♂, 1 ♀ (GUE); Sauble Beach, 10.viii 1983, K.N.Barber, swept from *Schizachyrium scoparium,* 1 ♂, 3 ♀ (GUE); Wagersville [Wagarville], 14.vii.1967, H.J.Teskey, 1 ♂ (BRI). **Saskatchewan:** Elbow, A.R.Brooks, 3.vi.1960, 3 ♂, 5 ♀, 17.vi.1960, 6 ♂, 1 ♀, 26.vi.1960, 3 ♂, 3 ♀, 12.vii.1960, 2 ♂, 3 ♀ (BRI); Indian Head, K.Stewart, 9.vii.1929, 2 ♂, 27.vii.1929, 4 ♂, 2 ♀ (BRI); Saskatoon, K.Stewart, 24.vii.1937, 1 ♀, 10.viii.1938, 2 ♀, 30.vi.1940, 1 ♀ (BRI); Bestville, 5.vii.1923, K.M.King, 2 ♂, 1 ♀ (BRI); St. Victor, 5.viii.1931, G.F.Manson, 1 ♂ (BRI). U.S.A. **Arizona:** Cochise Co., Dos Cabezas Mts., Mineral Park, 6500′, 11.viii.1976, D.S.Chandler, sweeping low vegetation, 2 ♀ (UAT); Cochise Co., Willcox, 19.iv.1956, E.Ordway, 1 ♀ (AMNH); Cochise Co., Round Valley Ref., 3miNW Portal, 26.viii.1976, D.S.Chandler, sweeping low vegetation, 1 ♂, 1 ♀ (UAT); Portal, 4800′, 17.v.1973, C.W.Sabrosky, 1 ♂ (USNM); Cochise Co., Rustler Pk., 22.v.1974, T.P.Sluss, 5 ♂, 6 ♀ (UAT) [Arizona I, Typical variants]; Cochise Co., Chiricahua Mts., 1miS Rustler, 27.v.1972, T.P.Sluss, 55 ♂, 35 ♀ (UAT), 10 ♂, 10 ♀ (USNM), 5 ♂, 5 ♀ (GUE), 5 ♂, 5 ♀ (BRI) [Arizona I, Arizona II, Apache-Catron variants]; Cochise Co., Chiricahua Mts., Onion Saddle, T.P.Sluss, 17.ix.1972, 1 ♂, 2 ♀ (BRI), 3 ♀ (UAT) [Apache-Catron variant], 26.viii.1973, 1 ♂, 4 ♀ (UAT) [Arizona I, Arizona II variants]; S.W.R.S., 5400′, 24.ix.1966, P.H.Arnaud, Jr., 2 ♂ (CAS) [Arizona I or Typical variant]; S.W.R.S., 5400′, 23.v-5.vi.1967, C.W.Sabrosky, eye gnat, 1 ♂ (USNM) [Arizona II variant]; 9mi[?] S.W.R.S., T.P.Sluss, 22.v.1974, 1 ♂, 3 ♀, 27.v.1975, 2 ♂, 2 ♀ (UAT) [Arizona I variant]; S.W.R.S., T.P.Sluss, 6.ix.1970, 6 ♂, 6 ♀, 8.ix.1970, 1 ♂, 9.ix.1970, 2 ♂, 2 ♀, 10.ix.1970, 5 ♂, 3 ♀ (UAT) [Arizona I, Arizona II, Apache-Catron? variants]; S.W.R.S., 7.vi.1957, J.W.Green, 1 ♀ (CAS) [Arizona I? variant]; Chiricahua Mts., A.H.Sturtevant Collection, 13.vii.1952, 8500′, 1 ♀, 15.vii.1952, 4000′, 1 ♂ (USNM) [Arizona II or Typical variants]; Cochise Co., Chiricahua Mts., Barfoot Lookout, T.P.Sluss, 26.viii.1971, 5 ♂, 7 ♀ (UAT), 8 ♂, 4 ♀ (BRI), 7.v.1972, [most] swept from *Muhlenbergia* sp., 34 ♂, 14 ♀ (UAT), 8 ♂, 4 ♀ (BRI), 5 ♂, 2 ♀ (GUE), 17.vi.1973, 5 ♂, 2 ♀ (UAT), 8.vii.1973, 14 ♂, 15 ♀ (UAT), 5 ♂, 3 ♀ (BRI), 22.v.1974, 11 ♂, 5 ♀ (UAT), 23.v.1974, 5 ♂, 3 ♀ (UAT), 28.vii.1975, 17 ♂, 14 ♀ (UAT), 4 ♂, 4 ♀ (BRI) [Arizona I, Arizona II variants]; Cochise Co., Chiricahua Mts., Barfoot Park, 6.ix.1970, T.P.Sluss, 3 ♂, 4 ♀ (UAT), 1 ♂ (BRI) [Arizona I variant]; Cochise Co., Chiricahua Mts., road to Herb Martyr, 6000′, 17.viii.1984, B.V.Brown, live oak/grass, sweeps, 1 ♀ (GUE); Grand Canyon N.P., No. Rim, 15.vii.1954, W.L.Downes, 3 ♂, 4 ♀ (ISU) [Apache-Catron, Arizona II?, Typical? variants]; Apache Co., Alpine, Luna Lake, 7900′, 9-14.vii.1979, S&J.Peck, pine meadows, 2 ♂, 3 ♀ (GUE) [Apache-Catron variant]; Apache Co.,

16miS Big Lake, 4.ix.1973, T.P.Sluss, 8 ♂, 9 ♀ (UAT), 3 ♂, 3 ♀ (BRI), 3 ♂, 3 ♀ (USNM) [Apache-Catron variant]; Graham Co., Pinaleno Mts., Goudy Creek, 9200′, 7.vii.1973, T.P.Sluss, 6 ♂, 2 ♀ (UAT) [Arizona I variant]; Sedona, Oak Creek Canyon, 29.vi.1953, W.W.Wirth, 1 ♂, 1 ♀ (USNM) [Southern variant]; Coconino Co., Flagstaff, 7100′, 18-25.vii.1979, S&J.Peck, pond. pine meadow Malaise trap, 2 ♂, 1 ♀ (GUE); Coconino Co., 20miN Flagstaff, Bonito Park, 7000′, ponderosa pine/ meadow, 5-8.viii.1984, B.V.Brown, sweeps, 3 ♂, 4 ♀, Malaise trap head, 3 ♂, 6 ♀, L.B.Carlson, sweeps, 1 ♂, 1 ♀, Malaise trap head, 1 ♀ (GUE); Huachuca Mts., Miller Canyon, A.L.Melander, 30.iv.1948, 1 ♀, 1.v.1948, 1 ♀, 2.v.1948, 2 ♂, 2 ♀, 3.v.1948, 1 ♀ (USNM) [Arizona II variant]; Pima Co., Mt. Lemmon, T.P.Sluss, 27.vi.1972, 8000′, 2 ♀ (UAT), 29.vi.1972, 8500′, swept from *Muhlenbergia* sp., 3 ♂, 4 ♀ (UAT), 21.vii.1972, 8200′, 8 ♂, 7 ♀ (UAT), 2 ♂, 3 ♀ (BRI), 6.ix.1973, 8300′, 3 ♂, 4 ♀ (UAT), 16.v.1975, 24 ♂, 31 ♀ (UAT), 5 ♂, 5 ♀ (BRI), 23.ix.1975, 8300′, 5 ♂ (UAT) [Arizona I, Arizona II variants]; Pima Co., Quinlan Mts., Kitt Peak, 6875′, 4.viii.1977, T.P.Sluss, 1 ♂, 1 ♀ (UAT) [Arizona II variant]; Tucson, 17.vi.1917, J.M.Aldrich, 1 ♂, 1 ♀ (USNM). **California:** Sierra Co., Sattley, 9.vii.1975, B.Villegas, 1 ♂ (UCD); Siskiyou Co., Salmon Trinity Alps Wilderness Area, Big Flat Cpgd., 5000′, 2.viii.1968, H.B.Leech, 1 ♂ (CAS); Trinity Co., Mtn. Mdw. Rch., head Coffee Cr., 5100′, 8-10.vii.1969, W.G.Goodman, 3 ♂ (UCD); Shasta Co., Platina, 1/2miE Jct. SR36 & A16, 16.vi.1974, Oman, 1 ♀ (OSU); Inyo Co., Deep Springs, 16.vii.1953, E.I.Schlinger, 1 ♀ (UCD); Inyo Co., Deep Springs, 11.vii.1953, J.W. MacSwain, 1 ♀ (UCB); Mint Canyon, Solemint, 28.iv.1955, W.R.Richards, 1 ♀ (BRI); Palmdale, Leona Valley, 6.v.1949, A.L.Melander, 2 ♀ (USNM); Victorville, 30.v.1944, A.L.Melander, 1 ♂, 1 ♀ (USNM); Marin Co., Mill Valley, 9.vii.1950, H.B.Leech, cheesecloth trap, 1 ♂ (CAS). **Colorado:** Jefferson Co., Evergreen, 8200′, 19.vii.1974, T.P.Sluss, 4 ♂, 2 ♀ (UAT); El Paso Co., Garden of the Gods Pk., Colorado Springs, 7500′, 15.vii.1974, T.P.Sluss, 4 ♀ (UAT); El Paso Co., Rampart Range Mts., 11miN Colorado Springs, 9000′, 15.vii.1974, T.P.Sluss, 1 ♂, 6 ♀, 1? (UAT); Teller Co., Florissant Fossil Beds, 8.viii.1973, D.Shetlar & D.Wilder, 5 ♂ (CAS) [Typical, Apache-Catron? variants]; La Plata Co., Durango, 10.vi.1977, Hanson & Knowlton, 1 ♂, 1 ♀ (USU); Boulder, 5miS, 5800′, W.R.M.Mason, 19.vi.1961, 4 ♂, 1 ♀, C.H.Mann, 9.vi.1961, 1 ♂, 12.vi.1961, 1 ♂, 16.vi.1961, 3 ♂, 1 ♀ (BRI); Boulder, 4.5 miN, 5500′, C.H.Mann, alkali slough prairie grass, 10.vi.1961, 4 ♀, 13.vi.1961, 5 ♂, 6 ♀, 20.vi.1961, 1 ♀ (BRI); Boulder, Flagstaff Canyon, 5800′, 10.vi.1961, C.H.Mann, on side of stream, 14 ♂, 6 ♀ (BRI); Boulder, 6000′, 4.vi.1961, B.H.Poole, 6 ♂, 1 ♀ (BRI); Boulder, 5500′, B.H.Poole, 1.vi.1961, 1 ♂, 9.vi.1961, 1 ♂, 10.vi.1961, 2 ♂, 1 ♀ (BRI); Boulder, Valmont Butte, 5300′, 7.vi.1961, C.H.Mann, 6 ♂, 3 ♀ (BRI); Boulder, Boulder Resvr., 5000′, 30.v.1961, B.H.Poole, in marsh, 1 ♂ (BRI); State Bridge nr. Bond, 7000′, 24-25.vi.1961, C.H.Mann, dry river bed and bank, 1 ♂ (BRI); 5 miE Nederland, 7500′, 2.vii.1961, J.G.Chillcott, 1 ♂ (BRI); Estes Park, 7500′, 20.vii.1961, C.H.Mann, 1 ♂, 5 ♀ (BRI) [Typical?, Apache-Catron? variants]; Grand Jct., 14.vi.1927, J.M.Aldrich, 1 ♂ (USNM); Holly, 19.ix.1951, A.H.Sturtevant Collection, 1 ♀ (USNM). **Idaho:** Cassia Co., 9miE Malta, R.P.Wight, [swept from *Agropyron cristatum*], 28.v.1981, 3 ♂, 1 ♀, 29.v.1981, 4 ♂, 1 ♀, 1.vi.1981, 2 ♂, 1.vii.1981, 1 ♂, 15.vii.1981, 1 ♂, 5 ♀, 16.vii.1981, 1 ♂, 28.vii.1981, 2 ♀, 31.vii.1981, 1 ♂, 1 ♀, 10.viii.1981, 3 ♂, 6 ♀, 1?, 11.viii.1981, 26 ♂, 38 ♀, 12.viii.1981, 2 ♂, 10 ♀, 13.viii.1981, 2 ♂, 3 ♀ (UIM); Cassia Co., 5miW Raft River, 4.vi.1981, R.P.Wight, 1 ♂ (UIM); Oneida Co., Holbrook Summit, G.F.Knowlton, 22.vii.1969, 1 ♂, 8.vii.1969, 1 ♀ (USU); Oneida Co., Holbrook, 1.ix.1971, G.F.Knowlton, on *Gutierezia sarothrae,* 1 ♀ (USU); 5miS Holbrook, 17.vii.1972, G.F.Knowlton & G.E.Bohart, sand dunes, 1 ♀ (USU); 5miNW Holbrook, 6.vii.1972, W.J.Hanson, Malaise trap, 1 ♂ (USU); Oneida Co., Rock Creek, 28.viii.1974, G.F.Knowlton, 1 ♂, 17.vii.1972, Knowlton & Bohart, 1 ♂, 3 ♀ (USU); Oneida Co., Twin Springs, 28.viii.1974, G.F.Knowlton, 1 ♂, 1 ♀ (UCD); Oneida Co., Salyer Cow Camp, 23.vii.1971, W.J.Hanson, 1 ♂, 2 ♀ (USU); Salyer Cow Camp, 11.viii.1972, G.F.Knowlton, 1 ♂ (UMIN); Oneida Co., S. of Roy, 13.vii.1972, G.F.Knowlton, 3 ♂, 2 ♀ (UMIN); Curlew Nat. Grasslands, 3miS Roy Summit, 6.vii.1972, G.F.Knowlton, 1 ♂ (UMIN); Oneida Co., Curlew V. Res., 22.vii.1969, G.F.Knowlton, 1 ♂ (USU); Oneida Co., Meadow Brook Cr., 29.vii.1972, G.F.Knowlton, 1 ♀ (UMIN); Blaine Co., Galena Summit, 15.vii.1961, 8600′, J.G.Chillcott, dry hillside, 2 ♂ (BRI); Butte Co., 6miS Howe, M.Stafford, 7.vii.1981, Malaise trap, 7 ♂, 5 ♀, 27.vii.1981, *Elymus cinereus,* 1 ♂ (UIM); Owyhee Co., 17miW Silver City, 8.viii.1963, A.R.Gittins, 1 ♀ (UIM); Hollister, 27.viii.1928, D.E.Fox, *Artemisia,* 1 ♀ (USNM); Castleford, 28.vi.1928, [no collector], "S. sophia" [?= *Descurainia sophia* (L.) Webb], 1 ♀ (USNM); Moscow, 8.vii.1916, J.M.Aldrich, 1 ♀ (USNM). **Kansas:** Atwood, 23.vii.1954, W.L.Downes, 2 ♂ (ISU); Nat. Hist. Res., Lawrence, 28.iv.1956, J.G.Chillcott, 1 ♂ (BRI); Stafford Co., 29.iv.1934, C.W.Sabrosky, 1 ♀ (PSU). **Michigan:** Warren Dunes St. Pk., 11.vi.1983, K.N.Barber, swept from *Schizachyrium scoparium,* 27 ♂, 37 ♀, 1?(GUE), 5 ♂, 5 ♀ (BRI); Warren Dunes, 13.ix.1952, A.H.Sturtevant Collection, 1 ♂, 2 ♀ (USNM). **Montana:** Geraldine, [no date], F.T.Cowan, 1 ♂, 3 ♀ (USNM); Gardiner, 17.viii.1918, A.L.Melander, 1 ♂ (USNM); 6miNW Browning, 18.vii.1969, B.A.Foote, 1 ♀ (UAT); Prairie Co., Barrial, [?].v.1953, R.B.Knapp, reared from slender wheatgrass clump, 1 ♂ (USNM); Liberty Co., "Spring".1953, H.W.Somsen, reared from grass clump, 1 ♂ (USNM); Daniels Co., Butler, 8.vi.1953, R.B.Knapp, reared from slender wheatgrass clump, 1 ♀ (USNM). **Nebraska:**

Crete, 3.vii.1960, W.F.Rapp, 1 ♀ (UNL) [Southern variant]. **New Mexico:** Taos Co., San Cristobal, 7400′, 13.vii.1974, T.P.Sluss, 3 ♂, 6 ♀ (UAT); Taos Co., Cabresto Lake, Sangre de Cristo Mts., 9000′, 13.vii.1974, T.P.Sluss, 4 ♂, 1 ♀ (UAT) [Apache-Catron, Typical variants]; Bernalillo Co., Isleta, 4900′, 16.vi.1979, S&J.Peck, cottonwood-tamarisk forest along canal, 2 ♀ (GUE); McKinley Co., 19miN Gallup, 14.viii.1972, J.G.Rozen & R.McGinley, 1 ♂ (AMNH); Hidalgo Co., 7.5miESE Portal, Arizona, 31.vii.1975, S.Frommer, 1 ♂ (UCR); Lincoln Co., Nogal Lake, 3miSE Nogal, 8.viii.1965, H.B.Leech, 1 ♀ (CAS); White Sands Nat. Mon., 5.viii.1966, D.R.Miller & R.L.Brunley, 2 ♀ (UCD); Las Cruces, 16.vi.1917, J.M.Aldrich, 1 ♂ (USNM); High Rolls, 4.vi.1902, [no collector], 1 ♀ (ANSP); Albuquerque, "viii", M.Bates, 1 ♀ (MCZ); San Ysidro, 3.vi.1961, W.J.Hanson, 1 ♀ (USU); Cloudcroft, 26.v.1964, J.F.McAlpine, 1 ♂ (BRI) [Apache-Catron variant]; Valencia Co., El Morro, 7200′, 9.ix.1935, T&G.Hubbell, 1 ♂ (UMIC) [Apache-Catron variant]; Catron Co., 8miSE Luna, 7500′, 9-14.vii.1979, S&J. Peck, pond. pine at stream, [Malaise trap], 4 ♂, 3 ♀ (GUE), 3 ♂, 3 ♀ (BRI), 2 ♂, 2 ♀ (USNM) [Apache-Catron variant]; 5miW Luna, 7400′, 9-14.vii.1979, S&J. Peck, San Francisco River, pond. pine meadows, [Malaise trap], 3 ♂, 6 ♀ (GUE) [Apache-Catron variant]; San Miguel Co., ½miNE Montezuma, 26.vi.1973, W.N. Mathis, 1 ♂ (OSU) [Apache-Catron variant]. **North Dakota:** Golden Valley Co., Beach, [?].v.1953, R.B. Knapp, reared from slender wheatgrass clump, 4 ♂, 2 ♀, 1? (USNM); Golden Valley Co., 18.v.1953, C. Benton, reared from slender wheatgrass clump, 1 ♂, 1 ♀ (USNM); Burke Co., 18.v.1953, C. Benton, reared from slender wheatgrass clump, 1 ♂, 1 ♀ (USNM); Burke Co., Powers Lake, [?].v.1953, C. Benton, reared from slender wheatgrass clump, 2 ♀ (USNM); Sioux Co., Solen, [?].v.1953, R.B. Knapp, reared from wild rye grass clump, 1 ♂ (USNM); Williams Co., Ray, [?].v.1953, C. Benton, reared from slender wheat grass clump, 1 ♂ (USNM); Divide Co., Ambrose, [?].v.1953, C. Benton, reared from western wheatgrass clump, 1 ♀ (USNM); Morton Co., 19.viii.1958, R.L. Post, 2 (NDSU); Minot, 13.vii.1953, C. Benton, reared from slender wheatgrass clump, 1 ♂ (USNM). **Oklahoma:** Murray Co., Sulphur, Chickasaw Rec. Area, 4.vi.1979, S&J. Peck, prairie vegetation, 1 ♂ (BRI) [Southern variant]. **Tennessee:** Knoxville, 28.viii.1916, J.M. Aldrich Collection, 1 ♂ (*P. antennalis* paratype, USNM) [Southern variant]. **Texas:** Big Bend N.P., Green Gulch 5000′, 14.v.1959, L. Bottimer, 6 ♂, 6 ♀ (BRI); Big Bend N.P., Panther Jct., 3500′, 13.v.1959, J.F. McAlpine, 1 ♂ (BRI); Big Bend N.P., Chisos Mts., Basin, 6000′, 15.v.1959, J.F. McAlpine, 1 ♂ (BRI); Big Bend N.P., Pulliam Canyon, 55-6500′, 12.v.1959, J.F. McAlpine, 1 ♂ (BRI); Big Bend N.P., Spring Oak, 19.v.1959, J.F. McAlpine, 1 ♀ (BRI); 10miW Ft. Davis, nr. Pt. of Rocks, 5000′, 30.v.1959, J.F. McAlpine, 1 ♂ (BRI); 14miW Ft. Davis, Hwy. 166, 9.v.1980, A. Konecny, dry grass pine & juniper, 3 ♂, 1 ♀ (GUE); Terrell Co., 7miN Sanderson, 28.viii.1974, G. Bohart & W. Hanson, 1 ♀ (USU); Real Co., Rio Frio, 2.iv.1955, W.W. Wirth, 1 ♂, 2 ♀ (USNM); Llano Co., Enchanted Rock, 15.vi.1953, W.W. Wirth, 1 ♂ (USNM); Jeff Davis Co., Toyahvale, 22.iii.1967, D.M. Wood, 1 ♂ (BRI); Kerrville, Henkes Pond, [?].iv.1955, W.W. Wirth, 1 ♀ (USNM); one additional male from Loew Collection, label illegible (USNM). **Utah:** Uintah Co., Bonanza, G.E. Bohart, 30.viii.1975, 1 ♂, 1 ♀, 4.ix.1975, 1 ♀, 17.vii.1974, on *Melilotus alba,* 1 ♂, 8.viii.1974, wet meadow, 1 ♂ (USU); Box Elder Co., Locomotive Springs, 22.vii.1969, G.F. Knowlton, 1 ♂, 5 ♀, 25.vii.1969, Knowlton & Hanson, 1 ♂ (USU); Box Elder Co., Snowville, 17miSW, [no collector], 9.vi.1969, 1 ♂, 29.v.1974, *Sitanion hystrix,* 3 ♂, 2 ♀, 24.vii.1975, *Agropyron cristatum,* 1 ♀ (USU); Box Elder Co., Cedar Creek Jct., 6.vi.1969, G.F. Knowlton, 1 ♂, 1 ♀ (USU); Box Elder Co., Kelton Pass, 9.vi.1969, G.F. Knowlton & J.Waldron, 1? (USU); Grand Co., Castleton, 20.vii.1968, [no collector], Malaise trap, 2 ♀ (USU); Grand Co., Moab, 23.v.1969, G.F. Knowlton, 1 ♂ (USU); Utah Co., Colton, 14.vii.1960, G.F. Knowlton, 1 ♂ (UCD); Garfield Co., Bryce Canyon, 19.vii.1954, W.L. Downes, 1 ♀ (ISU); Washington Co., Red Cliff Rec. Area, 14.vi.1978, Hanson & Knowlton, 1 ♀ (USU) [Southern variant]; Zion Nat. Pk., 28.vi.1945, G.F. Knowlton, 1 ♀ (UMIN) [Southern variant]; Zion Nat. Pk., Birch Creek, 28.vii.1965, W.J. Hanson & D.W. Davis, Malaise trap, 1♀ (USU); 10miSE Vernon, Wasatch Nat. For., 8.vii.1972, R.M. Miller, 1 ♀ (ISU); Mantua, 30.vi.1953, Knowlton & Hanson, 1 ♂ (USU); Vernal, 22.vii.1954, W.L. Downes, 1 ♂ (ISU) [Southern variant]; Salt Lake, [?].1912, C.N. Ainslie, reared from *Hordeum*, 1 ♂ (USNM) [Southern variant]; Salt Lake City, 18-20.vii.1917, J.M. Aldrich, 1 ♀ (*P. antennalis* paratype, USNM) [Southern variant]; Hooper, 28.vi.1937, D.E. Hardy, 1 ♀ (USU) [Southern variant]; Rainbow Bridge, [?].vii.1962, A.H. Sturtevant Collection, 1 ♀ (USNM) [Southern variant]. **Washington:** Colton, C.C. Shelton, virgin prairie population study, 18.vi.1948, 1 ♀, 6.vii.1948, 1 ♂, 1 ♀, 15.vii.1948, 5 ♂ (WSUP); Pullman, [no other data], A.L. Melander Collection, 1 ♂ (USNM); Pullman, 9.vii.[?], J.M. Aldrich, 1 ♀ (USNM); Pullman, 11.v.1922, A.L. Melander, 1 ♀ (USNM); Wawawai, 22.vi.[?], A.L. Melander Collection, 1 ♀ (USNM); Wenatchee, 4.v.1919, A.L. Melander, 1 ♂ (USNM). **Wyoming:** Manville, 25.vii.1951, R.E. Pfadt, 2 ♂, 2 ♀ (UWY); Torrington, 24.viii.1955, R.E. Pfadt, 1 ♂ (UWY); Centennial, 12.vii.1960, R.J. Lavigne, 1 ♀ (UWY); Gillette, Wyodok Plant Station 18, 6.vii.1977, D. Molnar, 1 ♀ (UWY); Glendo, R.E. Pfadt, 23.vii.1959, 20.vi.1963, 2 ♂ (UWY); Guernsey, 26.vii.1951, [no collector], 1 ♂ (UWY); Yellowstone Pk., Madison R., 4.viii.1918, A.L. Melander, 1 ♀ (USNM); Fremont Co., 52miSE Lander, 4.viii.1973, J. Sawbridge, 1 ♂ (OSU); Lincoln Co., 8miSE Smoot, 7.viii.1974, W.J. Hanson, 1 ♀ (USU); Lincoln Co., 1miN Alpine, 10.vii.1973, 5900′,

Oman & Musgrave, 1 ♀ (OSU); Laramie Co., 4miW Granite Canyon, 6.vii.1972, W.B. Stoltzfus & R.M. Miller, 2 ♂, 2 ♀ (ISU) [Typical, Apache-Catron? variants]; Laramie, Herrick's Lane, 26.vii.1960, R.J. Lavigne, 1 ♂ (UWY). MEXICO. **Durango:** 30miW Durango, 8000′, 6.v.1961, Howden & Martin, 4 ♂, 2 ♀, 6.vi.1964, J.F. McAlpine, 1 ♀ (BRI) [Arizona I or Southern variant]; 25miW Durango, 7500′, 6.v.1961, Howden & Martin, 1 ♀ (BRI) [Arizona I or Southern variant]. **Morelos:** 6miN Cuernavaca, 7500′, 15.viii.1954, J.G. Chillcott, 1 ♂, 1 ♀ (BRI) [Arizona I or Southern variant].

Remarks. The name *P. pruinosa* is here applied to perhaps the widest ranging and the most commonly collected species of the genus. It is highly variable and might involve a complex of several sibling species as discussed below under "Variation". The combination of the predominantly bare frons, the yellow tarsomere 1, and the presence of lateral bare areas on tergites 3-5 of the male place it with five other species. *Pseudodinia pruinosa* is most readily defined by the absence of the key characters used to recognize these other five species and thus identification usually requires dissection of the male genitalia, particularly with specimens from the western parts of its known range. The greatest difficulty lies in separating *P. pruinosa* from *P. occidentalis* and this is discussed in the "Remarks" under the latter species.

Malloch (1940) wrongly synonymized *P. pruinosa* with *P. varipes,* and since then all references to *P. varipes,* except for the type material of Coquillett, have in reality been to *P. pruinosa*. Malloch (1940) also listed a specimen from Medicine Hat, Alberta, under the name *P. nitida* Melander which is included in the list of material above.

Variation. Considerable variation occurs within this species, and five somewhat distinct variants, i.e., Typical, Apache-Catron, Southern, Arizona I, Arizona II, have been recognized. These variants are listed in Table I along with their respective geographical distributions and a summary of several ranges of salient character conditions. Most of the specimens in the previous list of "Other material examined" belong to the Typical variant; specimens that belong to each of the remaining four variants are indicated in square brackets.

The most prevalent of **Typical** variant is widely distributed from Ontario to British Columbia, south to California, Arizona, and Texas. It is characterized by having the vertex, frons, parafacial, and gena predominantly bare with only the ocellar triangle usually pruinose. In addition, the eye is usually longer than high (Fig. 3). In most genitalic characters, this variant could be described as average (Fig. 26). It is notable that the long series from Warren Dunes, Michigan, includes males with the widest aedeagi seen in this species, equivalent in width to the prevalent condition in *P. occidentalis*.

The **Apache-Catron** variant is named for the counties in which the largest series referred here were collected. This variant is recorded from the southwest with only occasional northern occurrences. It is very similar to the Typical variant but has a somewhat less pruinose thorax, the ocellar triangle is usually bare, and the hind tibia is entirely darkened dorsally in about half of the specimens. The genitalia (Fig. 27) usually exhibit a more elongate aedeagus and paramere, and the aedeagus usually has a well developed median trough.

The **Southern** variant corresponds to the appearance of the holotype. It ranges from Tennessee through Texas and Oklahoma to Arizona, Utah, and possibly central Mexico. This variant is characterized by the extensively pruinose vertex and upper frons usually forming a nearly complete transverse band to the level of the upper orbital seta. The parafacial is mostly, and the gena is entirely pruinose. The scape, pedicel, flagellomere 1 basal to the base of the arista, and the palp are paler, even yellow in several specimens, especially the two *P. antennalis* paratypes. These are only slightly but noticeably paler in the holotype male. The genitalia of the holotype (Fig. 25) are most similar to those of the Apache-Catron variant (Fig. 27) although the variation observed among the five other males blends into all others. The Southern and Apache-Catron variants are at opposite extremes in the density and extent of their pruinosity. Only 12 specimens, in addition to the holotype, are referred here.

Table I. Summary of variation and distribution of five nominal variants of *Pseudodinia pruinosa* Melander.

Variant	n	Measurements and Proportions: Body length mm.	Head h:l	Head w:l	Eye h:l	Eye:Gena h:w	Frons w:l	Orbital origin upper	Orbital origin lower	tergites (n/2) T6:T5	tergites (n/2) TS7+8:T5
Typical	54	1.9-2.9	1.1-1.4	1.6-2.0	0.8-1.0	4.0-5.6	1.1-1.3	0.1-0.3	04.-0.6	0.2-0.3	0.4-0.5
Apache-Catron	10	2.1-2.5	1.2-1.4	1.7-2.0	1.0-1.1	4.1-5.4	1.2-1.3	0.2-0.3	0.5	0.2-0.3	0.4-0.5
Southern	11	2.5-2.6	1.1-1.3	1.8-2.0	0.9-1.1	4.4-6.1	1.0-1.3	0.2-0.3	0.5-0.6	0.2-0.3	0.4-0.5
Arizona I	10.	2.0-3.0	1.2-1.3	1.8-2.0	1.0	4.7-5.5	1.1-1.4	0.2-0.3	0.5-0.6	0.2-0.3	0.4
Arizona II	10	2.4-3.1	1.3-1.4	1.8-2.0	1.0-1.1	4.5-5.7	1.2-1.3	0.2	05.-0.6	0.2-0.3	0.4

Variant	Colour: Pruinosity[a] Ocellar triangle	Orbital plate	Parafacial	Gena	Notum	Abdomen (bp:1)[c]		Ground colour[b] Antenna & palp	Hind tibia ay: length
Typical	+,+-	-	-	-	++,+++	0.0-1.0xT4	0.0-0.3xT4	bl,br	0.2-0.3
Apache-Catron	-,+-	-	-	-	+,++	0.0-1.0xT4	0.7-1.0xT3	bl,br	0.0-0.3
Southern	++[d]	+	+,+-	++	++,+++	0.7-1.0xT4	0.0-0.5xT4	bl,br,by	0.3-0.4
Arizona I	++[d]	+	+,+-	++	++,+++	0.0-0.7xT4	0.7-1.0xT3	bl	0.2-0.3
Arizona II	+	-	-,+-,	-,+-	++,+++	0.0-1.0xT4	0.7-1.0xT3	bl	0.2-0.3

Variant	Relative Measures of Male Genitalia[e]: Epandrium length	Paramere length	Aedeagus length	Aedeagus apex (thick)	Aedeagus keels	Distribution
Typical	1,2	1,2,3	1,2	1,2	1,2	BC to ONT south to AZ
Apache-Catron	2	3	3	2	1,2	AZ,NM,CO,WY
Southern	2	2,3	2,3	2	1,2	AZ,NE,OK,TN,UT,(MEX?)
Arizona I	1	1,2	1,2	1	2,3	AZ,(MEX?)
Arizona II	2	2	2,3	1	1	AZ

a +,++,+++ = progressively, relatively denser pruinosity; - = pruinosity absent; +- = variable or difficult to interpret.

b ay = apically yellow; bl = black; br = brown; by = basally yellow.

c bp:1 = pruinosity extends dorsomedially from base to as far as a basal proportion of indicated tergite.

d ocellar and orbital pruinosity often continuous, forming a tranverse band.

e 1,2,3 = progressively larger relative measures.

The remaining two variants are restricted to Arizona, except possibly for the Mexican specimens, and are generally collected together, even from the same plant as T.P. Sluss's collections from *Muhlenbergia* indicate.

The **Arizona I** variant, is externally very similar to the Southern variant in its extensive head pruinosity. It is more variable in the degree to which the transverse band of vertical pruinosity is developed, varying from discrete patches on the ocellar triangle and upper orbits to a nearly complete band, especially so in the Mexican specimens. No specimens have basally pale antennae or palps and the aedeagus is often relatively short with usually well defined preapical keels, and the epandrial apices are often slightly bent forward (Fig. 28). The Mexican series is somewhat intermediate between this variant and the Southern variant in characters of the genitalia.

The **Arizona II** variant has less extensive head pruinosity with the ocellar triangle usually lightly pruinose but the orbits and the intervening frontal area bare. The parafacial is predominantly, and the gena usually entirely bare. The aedeagus is usually rather

flattened apically with poorly developed keels, appearing thin in lateral view (Fig. 29).

Some series from Arizona show quite a discrete dimorphic separation of the last two variants but others do not. These latter series are difficult to align one way or the other. The other three variants each show considerable intravariant variation as well, often obscuring their definitions. The Southern and Apache-Catron variants, which represent extremes in pruinosity, are perhaps the most similar in details of the genitalia. The narrow lateral profile of the aedeagus in the Arizona II variant is matched by at least one series (Valmont Butte, Colorado) of the Typical variant. Despite the relatively regionalized distribution of these five variants, intermediate forms in genitalic characters can be found to satisfy virtually any combination of all of them. The relative restriction of three of these variants to Arizona testifies considerably to the importance of this region in providing relatively isolated pockets of suitable habitat for Chamaemyiini (Sluss 1977). In the interest of taxonomic conservatism, all five variants are treated under one name, *P. pruinosa*. Further resolution of this problem will require ecological investigations of possible resource partitioning.

Distribution (Fig. 69). *Pseudodinia pruinosa* is widely distributed across southern Canada and central to western United States, south to southern Mexico, but noticeably absent from the eastern United States and rare in the west coast states. One undetermined female from Olnes Alaska (USNM), may be *P. pruinosa* but has not been included in the above list or in Figure 69, because of doubts concerning its identity.

Biology. Adult *P. pruinosa* have been associated with the grass *Schizachyrium scoparium* (Michaux) Nees (Gramineae: Andropogonaceae) in Ontario, Manitoba, and Michigan (Barber 1984). The mealybug *Trionymus winnemucae* has been implicated as the prey species found in the leafsheaths of this grass and was used in successful egg to adult laboratory rearings of 36 individuals. These populations are referrable to the Typical variant discussed above.

No other records of mealybugs are available nor do any other label data implicate *S. scoparium* as a plant associate. However, adult P. pruinosa referrable to the Typical variant have been swept from the following plants: *Agropyron cristatum* (L.) Gaertner (crested wheatgrass) in Alberta, Idaho, and Utah; *Bromus inermis* Leyss (smooth brome) in Alberta; *Sitanion hystrix* (Nuttall) J.G. Smith (squirreltail) in Utah; alkali slough prairie grass in Colorado; *Artemisia* sp. (sage) in Idaho; and *Descurainia sophia* (L.) Webb (herb-Sophia) in Idaho.

In addition, label data using the word "reared" suggest an even stronger association with the following grasses: *Agropyron trachycaulum* (Link) Malte (slender wheatgrass) in Montana and North Dakota; *Agropyron smithii* Rydberg (western wheatgrass) in North Dakota; and *Elymus* sp. (wild rye) in North Dakota. These specimens are also referrable to the Typical variant.

One female referred to the Southern variant was "reared" from *Hordeum* sp. (barley) in Utah and many specimens of the Arizona I & II variants were swept from *Muhlenbergia* sp. (Muhly) in Arizona.

Among the above plant associates for the Typical variant, it is likely that only the grass species are significant. Certainly this variant is not restricted to one plant species and this would then account for its occurrence on the west coast where *S. scoparium* is not recorded (Hitchcock 1971). The significance of the plant records of the other variants cannot be assessed.

The type material of *T. winnemucae* was likely collected from a species of *Agropyron* in northwestern California (McKenzie 1967) but the status of a specific predator-prey relationship is not known (Barber 1984).

Phylogeny

Figure 72 summarizes the hypothesized phylogenetic relationships within *Pseudodinia*, and the putative synapotypies proposed as evidence for these relationships. Suffices A,

B, and C represent different character states in linear transformation series. Autapotypic character states of terminal taxa are shown only if they are similar to character states in other lineages.

There is considerable difficulty in attempting a phylogenetic analysis (*sensu* Hennig 1966) of the species of *Pseudodinia* for two primary reasons. One is the lack of a clear sister-group relationship between *Pseudodinia* and any other member of the Chamaemyiini. Knowledge of a sister group would help to determine the polarity or direction of change between homologous character states. *Parochthiphila* Czerny [including *Euestelia* Enderlein (Tanasijtshuk 1968)] was selected as the sister group of *Pseudodinia* since the former contains members which have a discrete, well developed anepisternal seta similar to that found in *Pseudodinia*; a character that is possibly a synapotypy indicating a sister-group relationship. This allowed determination of the ground-plan state of several characters for the genus *Pseudodinia* as a whole and recognition of two monophyletic species groups within *Pseudodinia*. In order to determine the polarity of homologous character states within a species group, the other species group served as the out-group.

A second problem with applying a phylogenetic analysis to this genus is the morphological conservatism of *Pseudodinia* species, which limits the number of unambiguous character states available for analysis. A combination of these two restrictions has left two unresolved trichotomies, a polychotomy, a questionable placement of *P. cinerea*, and necessitated the acceptance of a number of homoplasies (Fig. 72). The latter is partly due to the utilization of pruinosity characters which could readily be subject to homoplasy.

A survey was made of representatives of the other genera of the Chamaemyiini in order to help assess character states. One of these, *Melanochthiphila*, was originally erected by Frey (1958) as a subgenus of *Parochthiphila* to contain the single species *P. (Melanochthiphila) nigroaenea* Frey. Since then, McAlpine (1960) and Cogan (1980) have treated these as separate genera. It is highly probable that *Melanochthiphila* should be considered a junior synonym of *Parochthiphila* and will be treated as such here.

A representative of *Chaetoleucopis* Malloch has not been dissected but is considered very distantly related to *Pseudodinia*. Examinations were made of the male genitalia of at least one species of *Acrometopia* Schiner, *Toropamecia* Cogan, *Parapamecia* Cogan, *Pseudoleucopis* Malloch, *Plunomia* Curran, *Chamaemyia* Meigen, and *Parochthiphila* Czerny (including *Euestelia* Enderlein). Drawings of the male genitalia of *Parochthiphila nigroaenea* (provided by Dr. J.F. McAlpine), and the revisionary works of Cogan (1978), and Tanasijtshuk (1968, 1970) were also consulted. Character states occurring outside of *Pseudodinia* + *Parochthiphila*, which are similar to character states within *Pseudodinia,* are discussed under each apotypy defined below. Use of the term "out-group" below, refers to the Chamaemyiini including *Parochthiphila*.

Apotypic Character State Definitions

1 - apex of paramere bevelled with one outstanding setula near anteroventral aspect (Figs. 13-37, 45).

This condition is apparently unique to species of *Pseudodinia* (*Chaetoleucopis* not seen). The plesiotypic character state has not been clearly resolved but is probably an unmodified tubular structure with no apical modifications and with scattered setulae of equal strength.

2 - tibiae entirely yellow.

Basally darkened tibiae predominate in the out-group though entirely yellow tibiae occur in some species in several genera.

3A - lower orbital seta arising at 0.4 of frontal length (Fig. 1).
3B - lower orbital arising at 0.1-0.2 of frontal length (Figs. 2, 42).

The members of the out-group have the lower orbital arising in the lower half of the frons (0.5-1.0 of frontal length). This is considered the plesiotypic state and is shared by members of the *varipes* group (Figs. 3, 44). This allows recognition of an apparent transformation series in the *polita* group where this seta arises at sequentially higher levels

on the frons (3A to 3B). Only rarely do specimens of the *varipes* group have the lower orbital approaching the 0.4 level (0.4-0.7), but in these specimens, the seta is still arising slightly more anterior than in *P. tuberculata* (3A).

4 - full series of well developed orbital setulae (Figs. 1-2, 42).

The out-group condition is similar to that of the *varipes* group (Figs. 3, 44), with only scattered orbital setulae in the lower half at the lateral extremities of the anterior band of frontal setulae (see 10 below). A full series of well developed orbital setulae is found in the *polita* group, but not elsewhere in the Chamaemyiidae.

5 - lower margin of face projecting in lateral view (Figs. 1-2).

The out-group condition is a receding facial margin when viewed laterally, as in the *varipes* group (Fig. 3).

6 -anepisternal seta arising at 0.6-0.8 of anepisternal height (Fig. 4).

Within the out-group, only some *Parochthiphila* species bear a single, well developed anepisternal seta, arising at 0.5 of the anepisternal height, as in the *varipes* group (Fig. 5). A somewhat ambiguous transformation series exists within the *polita* group (0.6 in *P. tuberculata*, 0.6-0.7 in *P. meridionalis*, 0.7-0.8 in *P. polita*) but this has not been utilized.

7 - width of wing cell r_{2+3} 1.2-1.5X width of cell r_1 (Fig. 6).

The condition in the out-group is a relatively narrow cell r_{2+3}, subequal to cell r_1 as in the *varipes* group (Fig. 7; 0.8-1.1X r_1).

8 - female tergite 6 complete, not divided medially (Fig. 11).

The predominant out-group condition of this tergite is to be medially divided as in the *varipes* group (Fig. 12).

Plunomia species and *Chamaemyia paludosa* Collin also have this tergite complete, although in most species of *Chamaemyia* it is divided. Cogan (1978) indicates that the female tergite is complete in species of *Toropamecia* but examinations of *T. caribbea* Cogan, *T. jujuyensis* Cogan, and *T. veenota* Cogan have revealed a median division. A female specimen of *Chaetoleucopis* was not available.

9 - ratio of height of compound eye to genal width relatively high at 6.4-10.0 (Figs. 1-2).

The out-group condition is a relatively wide gena similar to that of the *varipes* group (Fig. 3). There is a slight overlap in the proportions between the *polita* group (6.4-10.0) and the *varipes* group (3.5-6.8) and each varies to an equivalent extent intraspecifically.

10 - frons with relatively weak, erect to slightly reclinate setulae sparsely scattered over most of its surface (Figs. 1-2, 42).

The predominant condition in the out-group is the relatively narrow band of proclinate setulae on the anterior half of the frons as in the *varipes* group (Figs. 3, 44). In the out-group, the only occurrence of relatively weak, erect to reclinate setulae scattered over most of the frons, is found in an Australian species (only one female seen) of *Pseudoleucopis*. The setulae are more dense than in the *polita* group and they are strongly reclinate. These two conditions are of doubtful homology and likely convergent in origin.

11 - epandrial condyle reduced, not hook-like (Figs. 15-37).

The development of the epandrial condyle varies considerably in the out-group. The elongate, hook-like condyle of the *polita* group (Figs. 13-14) is found in species of *Chamaemyia* and *Parochthiphila,* and is associated with epandrial shape (see 12 below).

12A - epandrium broadly triangular, apices only slightly tapered (Fig. 15).
12B - epandrial apices moderately tapered (Figs. 16-29, 33-37, 45, 47).
12C - epandrial apices strongly tapered, nearly parallel-sided (Figs. 30-32).

The predominant epandrial shape in the out-group most closely resembles that of the *polita* group (Figs. 13-14; associated with 11 above). A transformation series runs through the three consecutive stages of tapering defined above. The autapotypic, preapically

narrowed and medially curved condition found in *P. melanitida* (Fig. 18), is not indicated (Fig. 72).

The conditions found in *Plunomia, Pseudoleucopis,* and *Acrometopia reicherti* (Enderlein) approach that of the *varipes* group but are interpreted to be convergent in origin.

13A - strap-like sclerite of male not extending dorsally, but running uninterruptedly from the left sensory setula of sternite 6, to that of sternite 7, and continuing posteriorly to encircle spiracle 7 (Fig. 9).

13B - strap-like sclerite interrupted, reduced, sometimes absent; at most consisting of a separate sclerite on each of sternites 6 and 7 near the left sensory setula (Fig. 10).

The predominant condition in the out-group is similar to that of the *polita* group (Fig. 8) where this sclerite bears the left sensory setulae of sternites 6 and 7, encircles spiracle 7, and continues dorsally to fuse with the basal margin of tergite 7. A transformation series is recognized as running to the two successively reduced conditions above.

This sclerite is apparently completely lacking in *Plunomia* (similar to 13B) and the condition exhibited by *Chamaemyia* approaches that of 13A. Both examples are considered convergent in origin with similar conditions in *Pseudodinia.*

14 - male tergite 6 divided medially (Fig. 10).

The predominant out-group condition is a complete tergite 6 similar to the condition seen in the *polita* group (Fig. 8) and some members of the *varipes* group (Fig. 9). The divided condition is considered apotypic for some members of the *varipes* group, and yet the intraspecific considered apotypic for some members of the *varipes* group, and yet the intraspecific variation recognized in *P. varipes* and *P. occidentalis* suggests a rare plasticity of this character state.

Acrometopia wahlbergi (Zetterstedt) has a medially divided male tergite 6 and, as well, one specimen of a *Chamaemyia* species has been found to have an apparent median division.

15 - aedeagus strongly but gradually curved, in lateral view (Figs. 19-22).

The condition in the *varipes* group is an aedeagus which is basally less angular (Figs. 15-18, 23-37) relative to that of the *polita* group (Figs. 13-14). Within the *varipes* group, this basal shape is retained in all species except *P. varipes* (Figs. 19-21) and *P. latiphallis* (Fig. 22) in which the aedeagus has a strong, gradual curvature.

16A - frons entirely pruinose.

16B - frons bare on at least anterior half (reversal to plesiotypic state; as in Fig. 44).

The occurrence of a shiny frons in all members of the *polita* group (Fig. 42), and some members of the *varipes* group, indicates that the probable ground-plan state for *Pseudodinia* is a shiny frons. The pruinose frons (16A) is hypothesized to have arisen on two separate occasions. A reversal to the ground-plan state (16B) is interpreted as autapotypic in *P. nitens.*

A shiny frons is only rarely [*Parochthiphila nigroaenea* and *Acrometopia carbonaria* (Loew)] found outside of *Pseudodinia.*

17 - sublateral bare areas usually reduced on male tergites, often leaving tergites entirely pruinose.

The plesiotypic or ground-plan state for *Pseudodinia* is deduced to be that shared by all members of the *polita* group plus seven members of the *varipes* group, in which tergites 2-5 or 3-5 have successively larger sublateral bare areas (Fig. 47). The other seven species in the *varipes* group usually have a more extensively, often entirely, pruinose abdomen. Of these, two species, *P. nitens* and particularly *P. antennalis,* are known to be polymorphic with variably developed bare areas often present. As well, the only male specimen of *P. angelica* has relatively extensive sublateral bare areas. The relatively rare *P. hamata, P. angustata,* and *P. obscura,* have entirely pruinose abdomens. These latter four species may yet be determined to be similarly polymorphic for this character.

In all but one species of *Pseudodinia,* the female abdomen is never entirely pruinose, suggesting that the entirely pruinose abdomen is a male sex-linked character. However, the abdomen is entirely pruinose in both sexes of *P. cinerea* which suggests that there could be a different genetic basis for abdominal pruinosity in this species. Apotypic state 17 is interpreted to have arisen independently in *P. cinerea* and this relatively rare species is not expected to be found to be polymorphic for abdominal pruinosity.

The shiny bare tergites of *Parochthiphila nigroaenea* and *Acrometopia carbonaria* are likely convergent in origin (see 16 above).

18 - length of male tergite 6 0.3-0.4X tergite 5.

The predominant condition in the out-group is 0.2-0.3 (although that of *Plunomia* is about 0.6); the condition found in the two species of the *polita* group for which males are known, and in some members of the *varipes* group. The 0.3-0.4 condition is interpreted to be synapotypic in *P. hamata, P. angustata,* and *P. nitens* and convergently acquired in *P. cinerea.* The measurements for *P. obscura* and *P. antennalis* are ambiguous since each was consistently 0.3.

19 - flagellomere 1 basally yellow to at least base of arista.

The plesiotypic state is unicolourous or only very narrowly pale basally, as found in all *polita* group members and most *varipes* group members.

Discussion of Relationships

Examination of the genitalia of species of the out-group suggests that, as in *Pseudodinia,* the genera are recognizable and discrete phenetic entities. Thus, these generic concepts, which were originally based on combinations of external characters, are supported by internal comparisons. Exceptions are the three genera (*Acrometopia*, *Toropamecia*, and *Parapamecia*) which were studied by Cogan (1978). Cogan gave the snyapotypic possession of "bifoliate processes" as evidence of their monophyly, but these structures are here considered to be of questionable homology. These three genera likely form a monophyletic group as suggested by Cogan (1978) but their interrelationships remain unclear. For convenience, these three genera will be referred to below, as the *Acrometopia* group.

The potential sister groups for *Pseudodinia* can be reduced to six in the following order of likelihood: *Parochthiphila* (including *Euestelia* and *Melanochthiphila), Chamaemyia, Plunomia, Pseudoleucopis,* the *Acrometopia* group, and *Chaetoleucopis.* More extensive study will be required before a precise sister group of *Pseudodinia* is identified with any degree of confidence.

The only readily demonstrable synapotypy for all species of *Pseudodinia* is the unique structure of the apex of the paramere (1). Its interpretation as a synapotypy is supported by the unique combination of thoracic chaetotaxy of 0+2 dorsocentral setae and one anepisternal seta, the absence of pruinosity on the frons and abdomen (which occurs only in *Parochthiphila nigroaenea* and the distantly related *Acrometopia carbonaria*), and the geographical restriction of all *Pseudodinia* species to North America.

The monophyly of the *polita* group is supported by 9 synapotypies (2, 3A, 4-10). This is not a complete list since the unknown male of *P. tuberculata* precludes the use of the preapical cluster of setulae on the paramere (the plesiotypic conditions of male genitalic characters 11-13 were assumed). There could also be a difference in habitat selection between the two species groups whereby the *polita* group may be associated with riparian habitats and less restricted ovipositional sites.

The *varipes* group is less distinctive and its monophyly is supported by three putative synapotypies (11, 12A, 13A). Similar character states elsewhere in the Chamaemyiini are interpreted as convergent in origin. A significant character is the strap-like sclerite of the male and its reduction (13A) relative to that of the *polita* group. A further reduction in this sclerite (13B) unites the majority of the *varipes* group as a monophyletic group distinct from *P. cinerea, P. nigritarsis,* and *P. slussi.*

The alignment of *P. cinerea* as the sister group of the rest of the *varipes* group (12B

above), requires a convergent acquisition in *P. cinerea,* of a pruinose frons (16A) and a more extensively or entirely pruinose male abdomen (17) with the *P. hamata* + *P. angustata* + *P. nitens* + *P. angelica* + *P. obscura* + *P. antennalis* lineage, and a relatively elongate male tergite 6 (18) with the *P. hamata* + *P. angustata* + *P. nitens* lineage. These convergences may be overcome by placing *P. cinerea* as sister species of the latter three species. This arrangement however, would create two reversals in two structural characters [a complete male tergite 6 (character 14) and an undivided, well developed strap-like sclerite in the male (13A)] in *P. cinerea,* or a minimum of four convergent acquisitions of the apotypic states (13B, 14) in other lineages of the *varipes* group. Due to the plasticity of vestiture or pruinosity characters (16B, 17), the latter arrangement involving homoplasies in two structural characters would appear less parsimonious than the former involving homoplasies in two pruinosity characters and only one structural character. *Pseudodinia cinerea* is a very distinctive species (female abdomen entirely pruinose, paramere expanded apically, sternite 10 linear, vestige of tergite 10 relatively elongate), most readily interpreted as highly autapotypic despite retaining the relatively plesiotypic states of characters 13 and 14. The convergent acquisition of character states 16A, 17, and 18 are therefore interpreted to be autapotypic in *P. cinerea.*

The six species clustered around *P. varipes* and *P. pruinosa* comprise a weakly characterized group. There is a possibility that all but *P. slussi* could prove to be a monophyletic group. Presently, this complex is defined on symplesiotypies with one sister species pair, *P. latiphallis* + *P. varipes,* supported by the synapotypic condition of the aedeagus (15). This sister-group relationship is also suggested by a tendency for the epandrium to be more triangular than most other species of the *varipes* group, though not to the same extent as *P. cinerea.* This is quite variable and no attempt was made to use this in the analysis.

The extensive pruinosity of the frons (16A) and male abdomen (17), both convergently acquired by *P. cinerea,* supports the monophyly of six species. Within this grouping, the monophyly of the *P. hamata* + *P. angustata* + *P. nitens* lineage is relatively well supported (12C, 18), despite the convergent acquisition of a relatively elongate male tergite 6 (18) in *P. cinerea.* The almost identical male genitalia of *P. angustata* and *P. nitens* suggest a close relationship but this has not been confirmed with a recognized synapotypy. The reversal to a bare frons (16B) in *P. nitens* indicates the questionable value of this character at other levels in Figure 72. The grouping of *P. angelica* + *P. obscura* + *P. antennalis* is supported only by the yellow base of flagellomere 1 (19).

Summary

The genus *Pseudodinia* fits well within the Chamaemyiini in morphological and ecological attributes of the larva and adult. The larva lacks the abundant cuticular processes of the Leucopini and feeds on mealybugs found on grasses. The adult has a narrow lunule lacking setulae, the male has two pairs of sternal and tergal elements between segment 5 and the genital segment, and the adults are found closely associated with the larval habitat.

Pseudodinia has been well diagnosed but the monophyly of the genus has been supported by only one synapotypy. Further work within the Chamaemyiini is needed to clearly identify a sister group to *Pseudodinia.* The two species groups recognized here, the *polita* group and the *varipes* group, are quite distinct, while the exact relationship of *P. cinerea* within the *varipes* group remains questionable.

Morphological conservatism predominates within each species group. Decisions on specific limits have been similarly conservative, with a preference to accept several phenetically variable species concepts (*P. pruinosa, P. antennalis, P. varipes,* and *P. occidentalis*). These decisions have been strongly influenced by ecological observations made in Ontario (Barber 1984) which have correlated resource partitioning with morphological divergence. Although resource partitioning is clearly evident among some sympatric species associated with different plants in Ontario (*P. pruinosa* on *S. scoparium, P. antennalis* on *A. gerardi,*

and *P. nitens* on neither), it is presumed to be considerably more subtle among others (*P. antennalis* and *P. varipes* on *A. gerardi*). The possibility of several species co-occurring on the same plant cannot be discounted (*P. pruinosa, P. antennalis,* and *P. latiphallis* on *Muhlenbergia* in Arizona).

Future work should be directed toward morphological and ecological investigations in the southwestern United States, particularly on the variants of *P. pruinosa* and *P. antennalis,* and how they relate to other species. Arizona appears to be the best study area since all variants of *P. pruinosa,* and seven of the remaining 13 species of the *varipes* group, occur in that state. As well, the collection at the University of Arizona (UAT) has one of the most extensive holdings of *Pseudodinia* species.

Acknowledgements

Dr. D.H. Pengelly was the person who introduced me to the Insecta. His constant encouragement has carried on into his retirement near Erickson, Manitoba, where he and Fran provide an oasis for travelling insect collectors. My M.Sc. committee members, Drs. S.A. Marshall, J.F. McAlpine (Biosystematics Research Institute), and J.E. Laing, provided valuable input, encouragement, and critical review, while financial support from NSERC Grant No. 852-36 to SAM was received. Drs. S.B. Peck, M. Sanborne (Carleton University), and G.A.P. Gibson (University of Alberta) provided valuable alcohol-preserved trap residues. Dr. D.R. Miller (Systematic Entomology Laboratory, Beltsville) identified the pseudococcid specimens. Cooperation from Parks Canada and Ontario Ministry of Natural Resources personnel provided access to parks in Ontario. D.J. Hamilton and A.K. Smith provided technical assistance and advice in preparing the figures and electron micrographs, respectively. B.V. Brown, J.M. Heraty, and Dr. H.J. Teskey (BRI) have reviewed and offered valuable criticisms of previous drafts.

References

Barber, K.N. 1984. A revision of *Pseudodinia* Coquillett (Diptera: Chamaemyiidae. Unpublished M.Sc. thesis. Dept. of Environmental Biology, University of Guelph, Guelph, Ontario.

Brullé, A. 1832. Mémoire sur un genre nouveau de Diptères, de la familles des Tipulaires. Ann. Soc. entomol. de France 1: 205-209.

Cogan, B.H. 1978. A revision of *Acrometopia* Schiner and closely related genera (Diptera: Chamaemyiidae). Beitr. Ent. 28: 223-250.

———————— 1980. 52. Family Chamaemyiidae. *In* R.W. Crosskey, B.H. Cogan, P. Freeman, A.C. Pont, K.G.V. Smith, and H. Oldroyd, Catalogue of the Diptera of the Afrotropical Region. British Museum (Natural History) Publication No. 821, 1437 pp.

Frey, R. 1958. Zur Kenntnis der Diptera brachycera p.p. der Kapverdischen Inseln. Commentat. biol. 18: 1-61.

Frison, T.H. 1927. A list of the insect types in the collections of the Illinois State Natural History Survey and the University of Illinois. Bull. Ill. St. nat. hist. Survey, Urbana 16: 137-309.

Godfrey, W.E. 1976. The Birds of Canada. National Museums of Canada, Bull. No. 203, Biological Series No. 73, 428 pp.

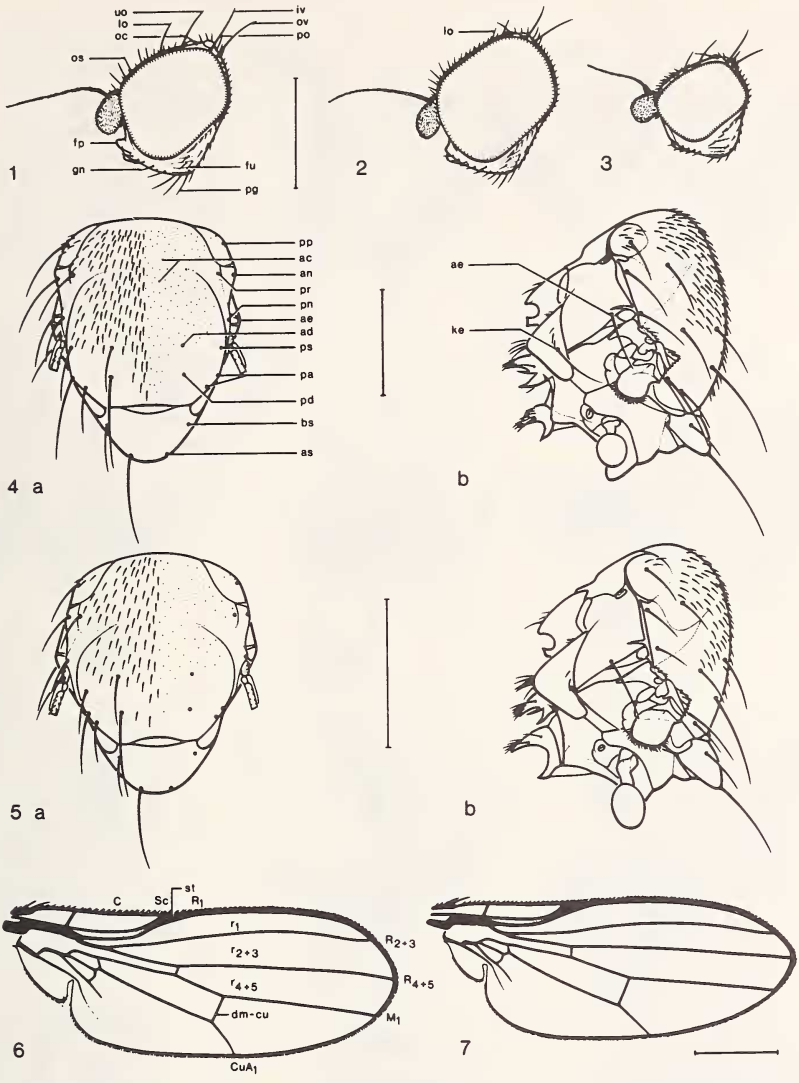
Griffiths, G.C.D. 1972. The Phylogenetic Classification of Diptera Cyclorrhapha with Special Reference to the Structure of the Male Postabdomen. Dr. W. Junk N.V., The Hague, 340 pp.

Hennig, W. 1941. Beitrage zur Kenntnis der Kopulationsapparates und der Systematik der Acalyptraten. III. Pallopteridae, Thyreophoridae, Diopsidae, *Pseudopomyza, Pseudodinia* (Diptera). Arb. morph. taxon. Entomol., Berlin-Dahlem 8: 54-65.

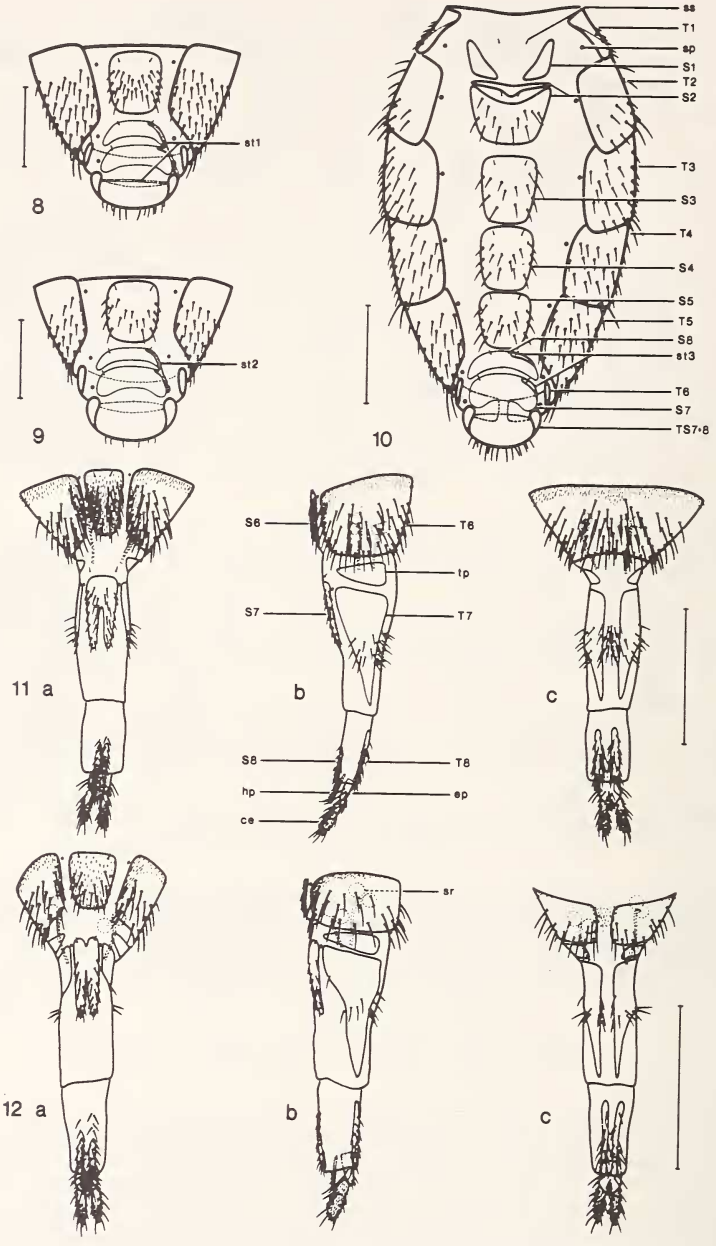
Hitchcock, A.S. 1971. Manual of the Grasses of the United States. Second Edition revised by Agnes Chase. Dover Publications, Inc., New York, N.Y., 1051 pp.

Malloch, J.R. 1915. Notes on the flies of the genus *Pseudodinia,* with description of a new species. Proc. U.S. natl. Mus. 49: 151-152.
———— 1921. Forest insects in Illinois I. The subfamily Ochthiphilinae (Diptera, Family Agromyzidae). Bull. Ill. St. nat. hist. Survey, Urbana 13: 345-361.
———— 1940. The North American genera of the dipterous subfamily Chamaemyiinae. Ann. Mag. nat. Hist., London 6: 265-274.
McAlpine, J.F. 1960. A new species of *Leucopis (Leucopella)* from Chile and a key to the world genera and subgenera of Chamaemyiidae (Diptera). Can. Entomol. 92: 51-58.
———— 1963. Relationships of *Cremifania* Czerny and a new species (Diptera: Chamaemyiidae). Can. Entomol. 95: 239-253.
———— 1965. Family Chamaemyiidae. Pp. 706-709. *In* A. Stone, C.W. Sabrosky, W.W. Wirth, R.H. Foote, and J.R. Coulson, editors, A Catalog of the Diptera of America North of Mexico. USDA, Agriculture Handbook 276, 1696 pp.
———— 1981. Morphology and Terminology — Adults. Pp. 9-63. *In* J.F. McAlpine, B.V. Peterson, G.E. Shewell, H.J. Teskey, J.R. Vockeroth, and D.M. Wood, editors, Manual of Nearctic Diptera, Vol 1. Agriculture Canada Monograph 27, 674 pp.
McKenzie, H.L. 1967. Mealybugs of California with Taxonomy, Biology, and Control of North American Species. Univ. of California Press, Berkeley and Los Angeles, 525 pp.
Melander, A.L. 1913. A synopis of the dipterous groups Agromyzinae, Milichiinae, Ochthiphilinae and Geomyzinae. J. N. Y. entomol. Soc. 21: 219-273, 283-300.
———— and A. Spuler. 1917. The dipterous families Sepsidae and Piophilidae. Bull. Wash. agr. exp. Sta. 143: 1-103.
Miller, D.R., Research Scientist, Systematic Entomology Laboratory, IIBIII, USDA, Beltsville, Maryland. Personal communications dated December 30, 1981, and March 12, 1984.
Sluss, T.P. 1977. Evolution of Arizona Chamaemyiidae (Diptera). Unpublished Ph.D. dissertation, Dept. of Entomology, University of Arizona, Tucson.
Steyskal, G.C. 1971. The genus *Paraleucopis* Malloch, with one new species. Entomol. News 82:1-4.
Tanasijtshuk, V.N. 1968. Palaeartic species of the genus *Parochthiphila* (Diptera: Chamaemyiidae). Entomol. Obozr. 47: 633-651. [English translation in Entomol. Rev., Wash. 47: 388-399]
Teskey, H.J. 1981. Morphology and Terminology — Larvae. Pp. 65-88. *In* J.F. McAlpine, B.V. Peterson, G.E. Shewell, H.J. Teskey, J.R. Vockeroth, and D.M. Wood, editors, Manual of Nearctic Diptera, Vol. 1. Agriculture Canada Monograph 27, 674 pp.
Wulp, F.M. Van Der. 1867. Eenige Noord-Americaansche Diptera. Tijdschr. v. Entomol. 10: 125-164.

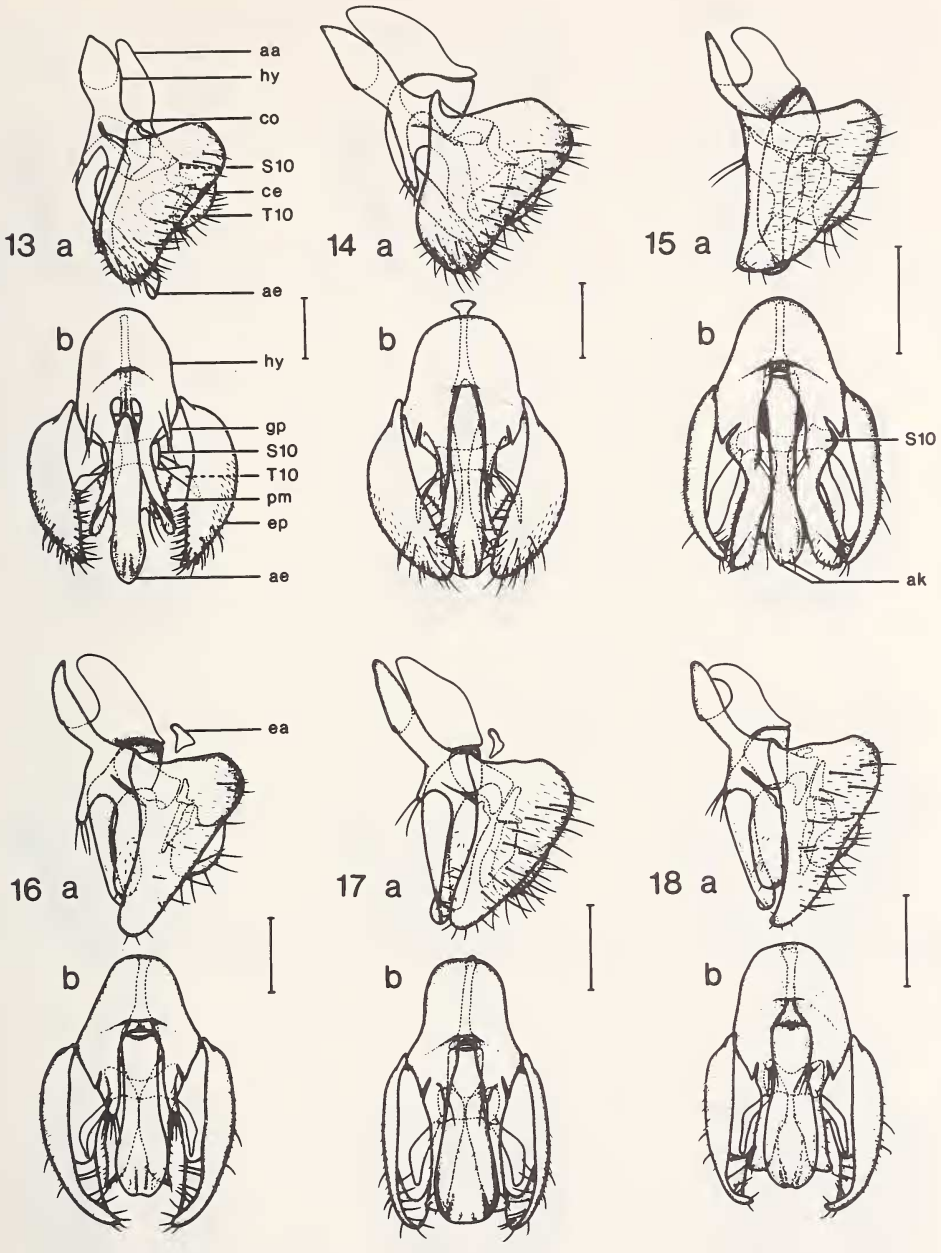
(Received 7 March 1985; accepted 3 June 1985)



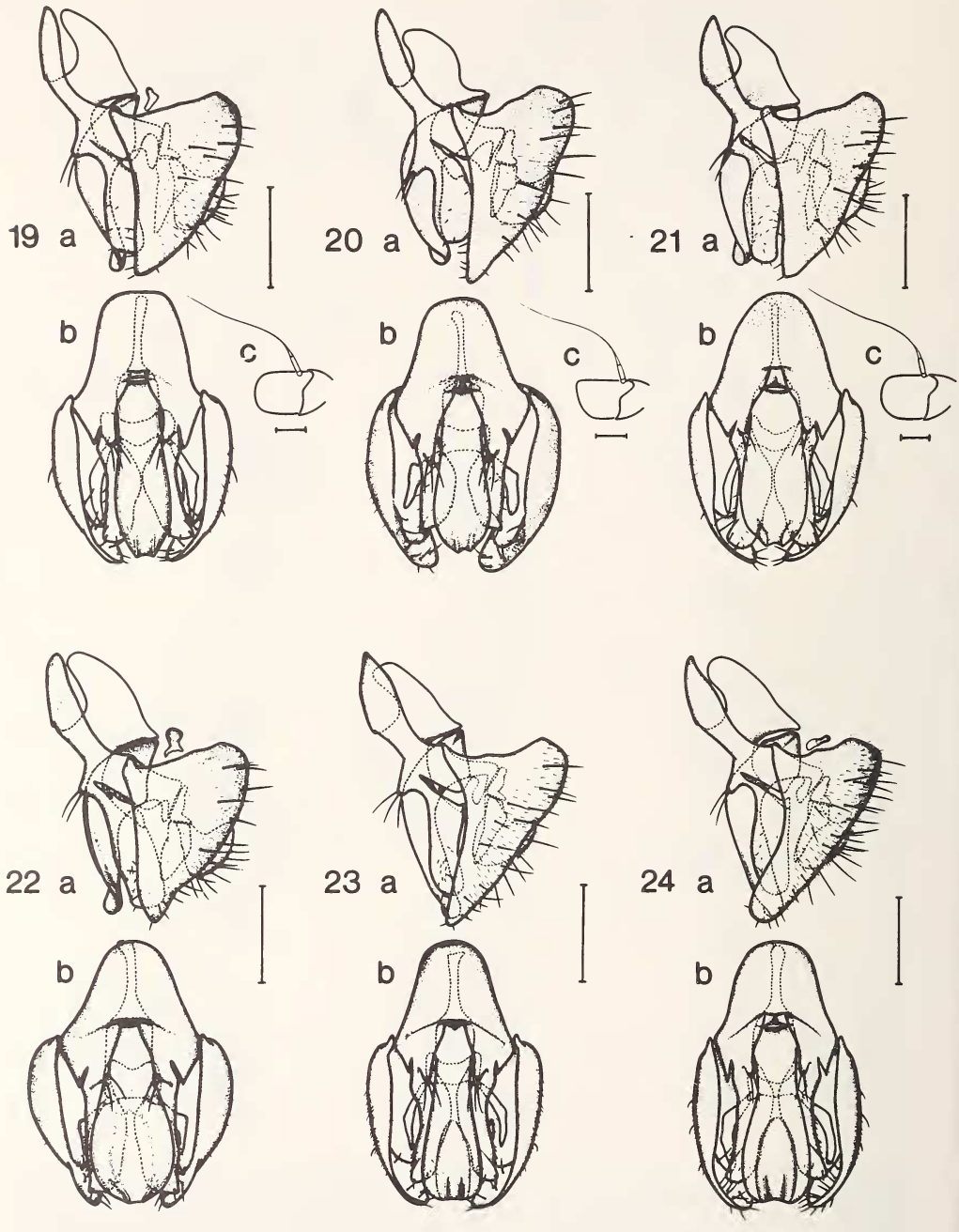
FIGS.. 1-7. Heads, thoraces, and wings (bars =0.5 mm.). 1-3, heads, female, left lateral: 1, *P. tuberculata,* holotype, Chiapas; 2, *P. polita,* paratype, Illinois; 3, *P. pruinosa,* Ontario. 4-5, thoraces, female (wings and pruinosity not included), a, dorsal (setae included on left side only), b, left lateral: 4, *P. polita,* paratype, Illinois; 5, *P. pruinosa,* Ontario. 6-7, left wings, male, ventral: 6, *P. polita,* Ontario; 7, *P. pruinosa,* Ontario. Abbreviations: ac - acrostichal setulae; ad - anterior dorsocentral seta; ae - anepisternal seta; an - anterior notopleural seta; as - apical scutellar seta; bs - basal scutellar seta; C - costa; CuA_1 - anterior branch of cubitus; dm-cu - discal medial-cubital crossvein; fp - facial prominence; fu - genal-occipital furrow; gn - genal seta; iv - inner vertical seta; ke - katepisternal seta; lo - lower orbital seta; M_1 - media; oc -ocellar seta; os - orbital setula; ov - outer vertical seta; pa - postalar setae; pd - posterior dorsocentral seta; pg - postgenal seta; pn - posterior notopleural seta; po - postocellar seta; pp - postpronotal seta; pr - presutural supra-alar seta; ps - postsutural supra-alar seta; R_1 - anterior branch of radius; R_{2+3}, R_{4+5} - posterior branches of radius; r_1, r_{2+3}, $r_4{}_+{}_5$ - radial cells; st - stigma of subcostal cell; Sc - subcosta; uo - upper orbital seta.



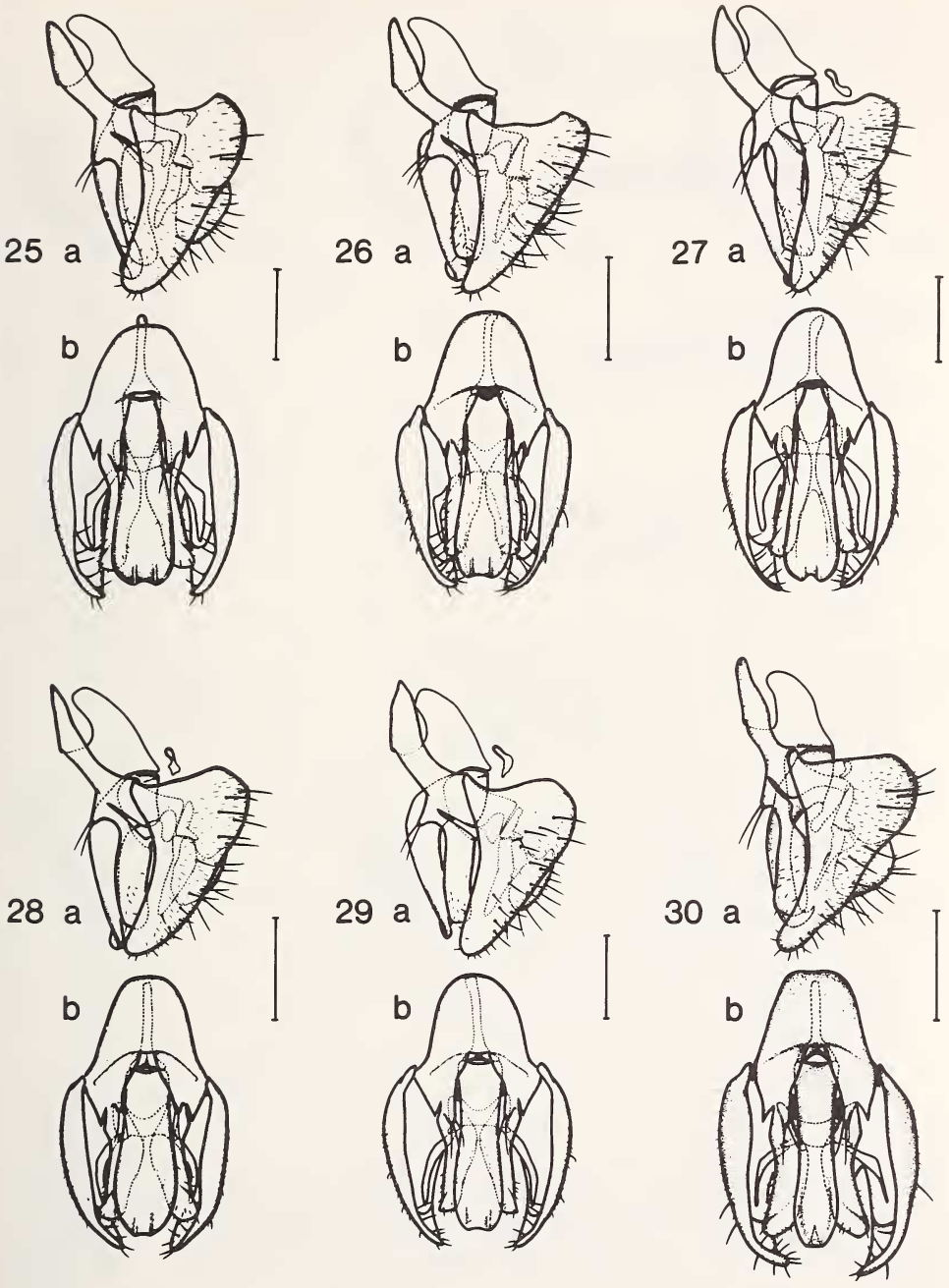
FIGS. 8-12. Abdomens. 8-10, male, genitalia removed, ventral (pruinosity not included, bars = 0.25 mm.): 8, *P. polita,* Nebraska, segments 5-7; 9, *P. cinerea,* paratype, Durango, segments 5-7; 10, *P. pruinosa,* Ontario, segments 1-7. 11-12, female, segment 6 to proctiger (bars = 0.5 mm.), a, ventral, b, lateral, c, dorsal: 11, *P. polita,* paratype, Illinois; 12, *P. pruinosa,* Ontario. Abbreviations: ce - cercus; ep - epiproct; hp - hypoproct; S1-8 - sternites; sp - spiracle; sr - spermatheca; ss - sensory setula; stl-3 - successively reduced conditions of strap-like sclerite; T1-8 - tergites; tp - triangular piece; TS7+8 - syntergosternite 7+8.



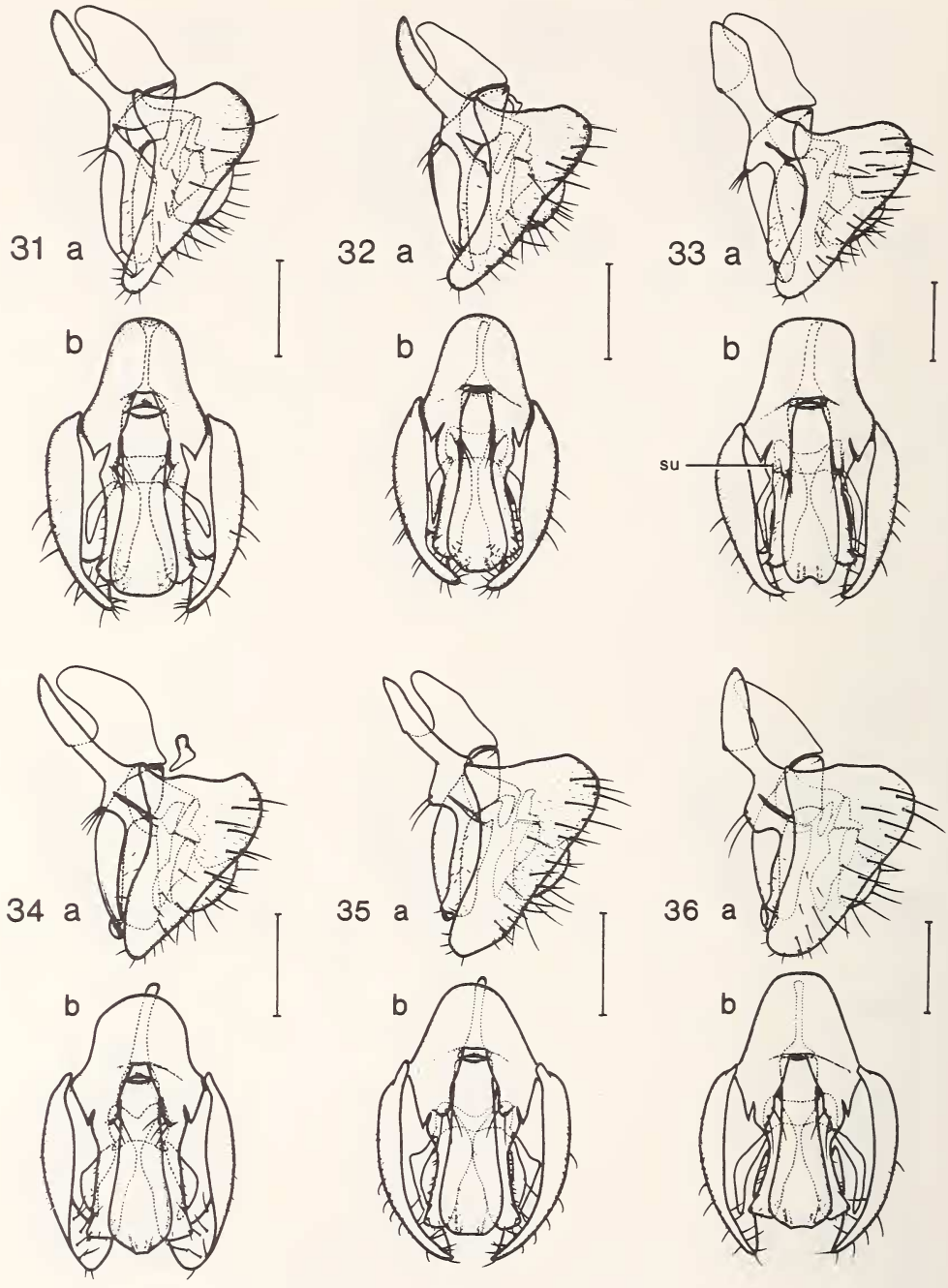
FIGS. 13-18. Male genitalia (bars = 0.1 mm.), a, left lateral, b, ventral. 13, *P. polita,* paratype, Illinois. 14, *P. meridionalis,* paratype, Costa Rica. 15, *P. cinerea,* paratype, Durango. 16, *P. nigritarsis,* holotype, California. 17, *P. slussi,* holotype, Arizona. 18, *P. melanitida,* Manitoba. Abbreviations: aa - aedeagal apodeme; ae - aedeagus; ak - aedeagal keels; ce - cercus; co - epandrial condyle; ea - ejaculatory apodeme; ep - epandrium; gp - gonopod; hy - hypandrium; pm - paramere; S10 - sternite 10; T10 - vestiges of tergite 10 and epiproct.



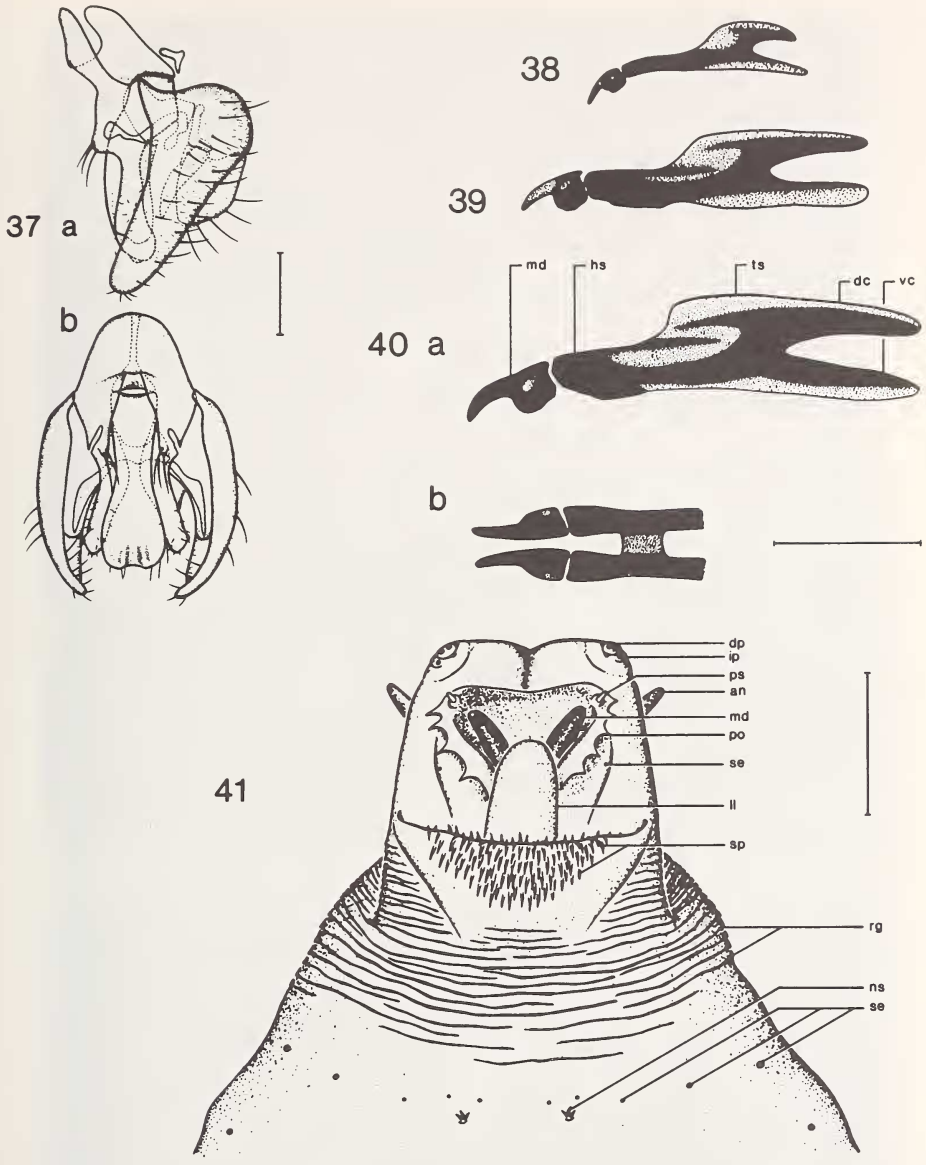
FIGS. 19-24. Male genitalia and antennae (bars = 0.1 mm.), a, genitalia, left lateral, b, genitalia, ventral, c, left antenna, lateral. 19-21, *P. varipes: 19,* holoype, New Mexico; 20, Creston, British Columbia; 21, Ontario. 22, *P. latiphallis,* paratype, Durango. 23-24, *P. occidentalis,* paratypes: 23, Arizona; 24, California.



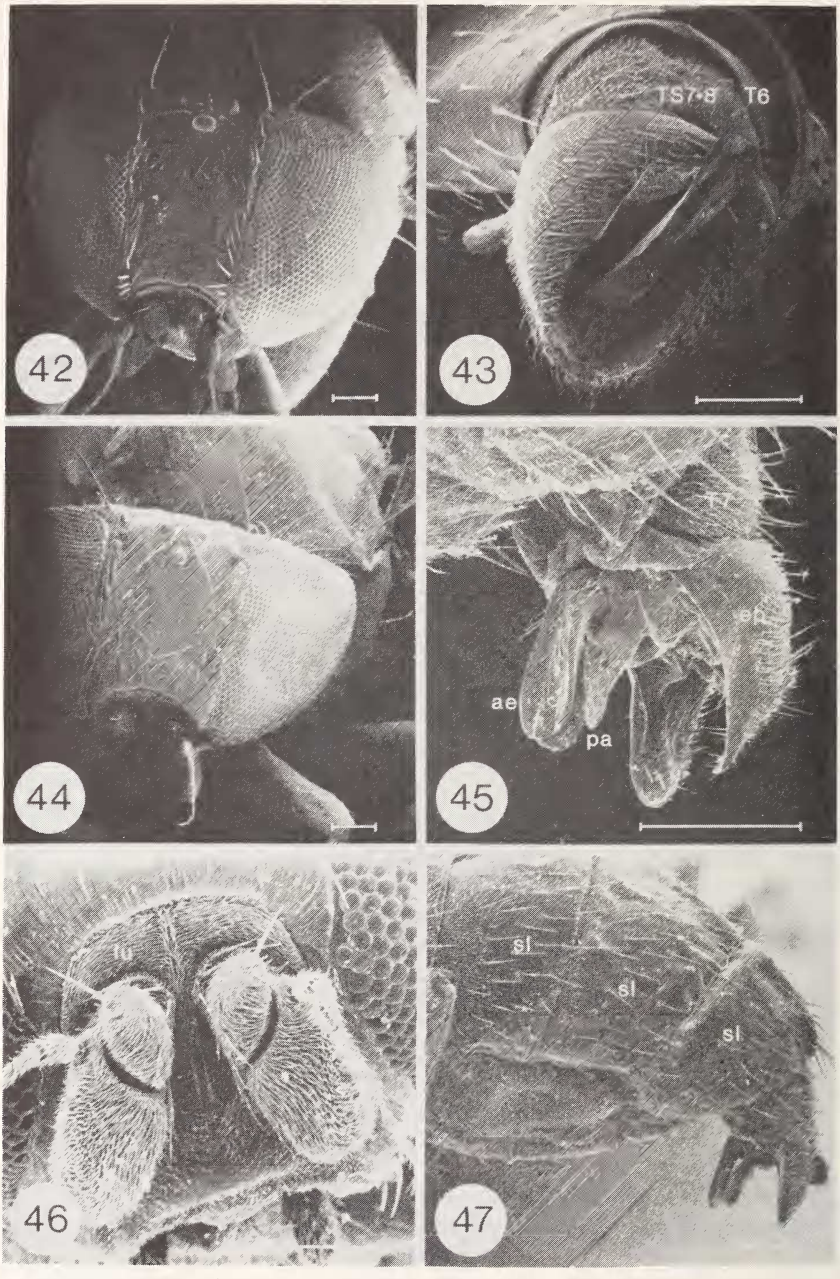
FIGS. 25-30. Male genitalia (bars = 0.1 mm.), a, left lateral, b, ventral. 25-29, *P. pruinosa: 25,* holotype, Texas; 26, Ontario, Typical variant; 27, New Mexico, Apache-Catron variant; 28, Arizona, AZ I variant; 29, Arizona, AZ II variant. 30, *P. hamata,* paratype, Arizona.



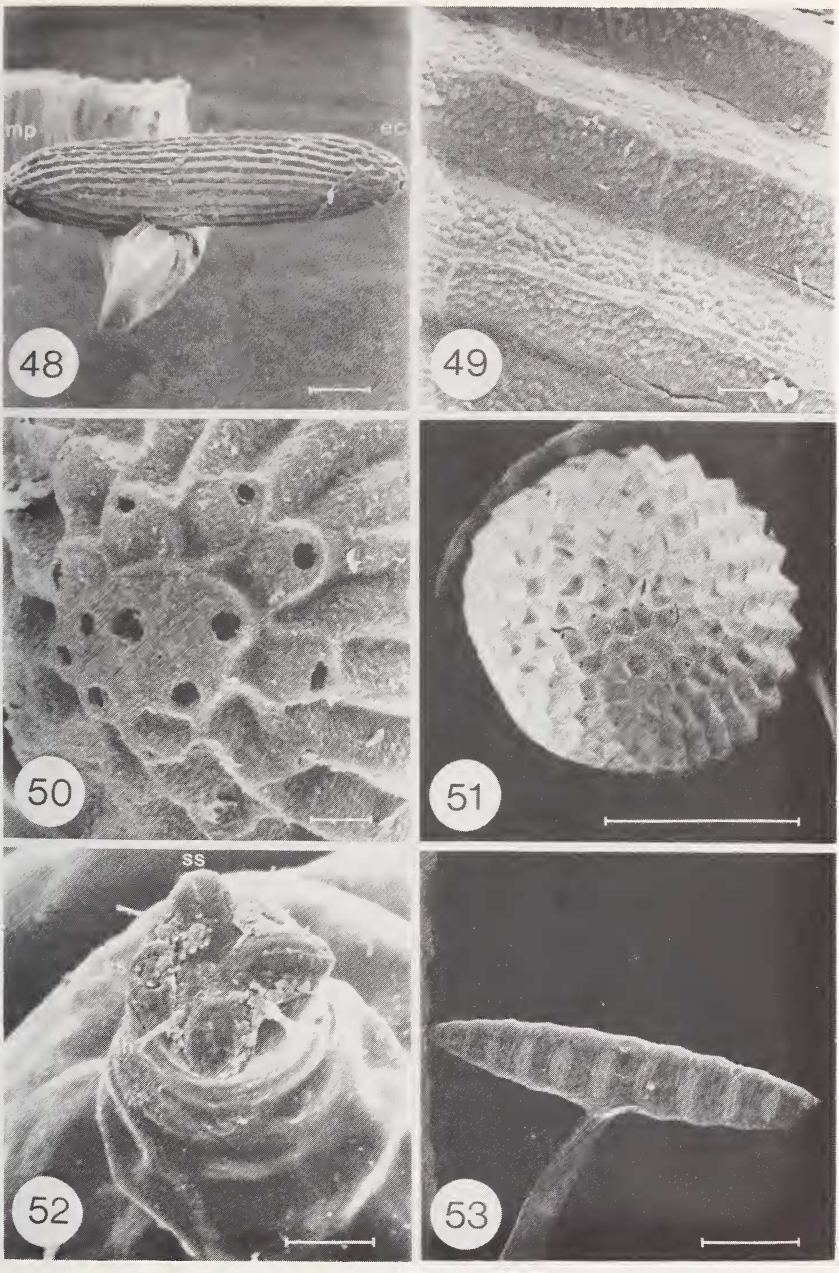
FIGS. 31-36. Male genitalia (bars = 0.1 mm.), a, left lateral, b, ventral. 31, *P. angustata,* paratype, Arizona. 32, *P. nitens,* New Mexico. 33, *P. angelica,* holotype, California. 34-36, *P. antennalis: 34,* holotype, Virginia; 35, Ontario; 36, Kitt Peak, Arizona. Abbreviation: su - supernumerary seta.



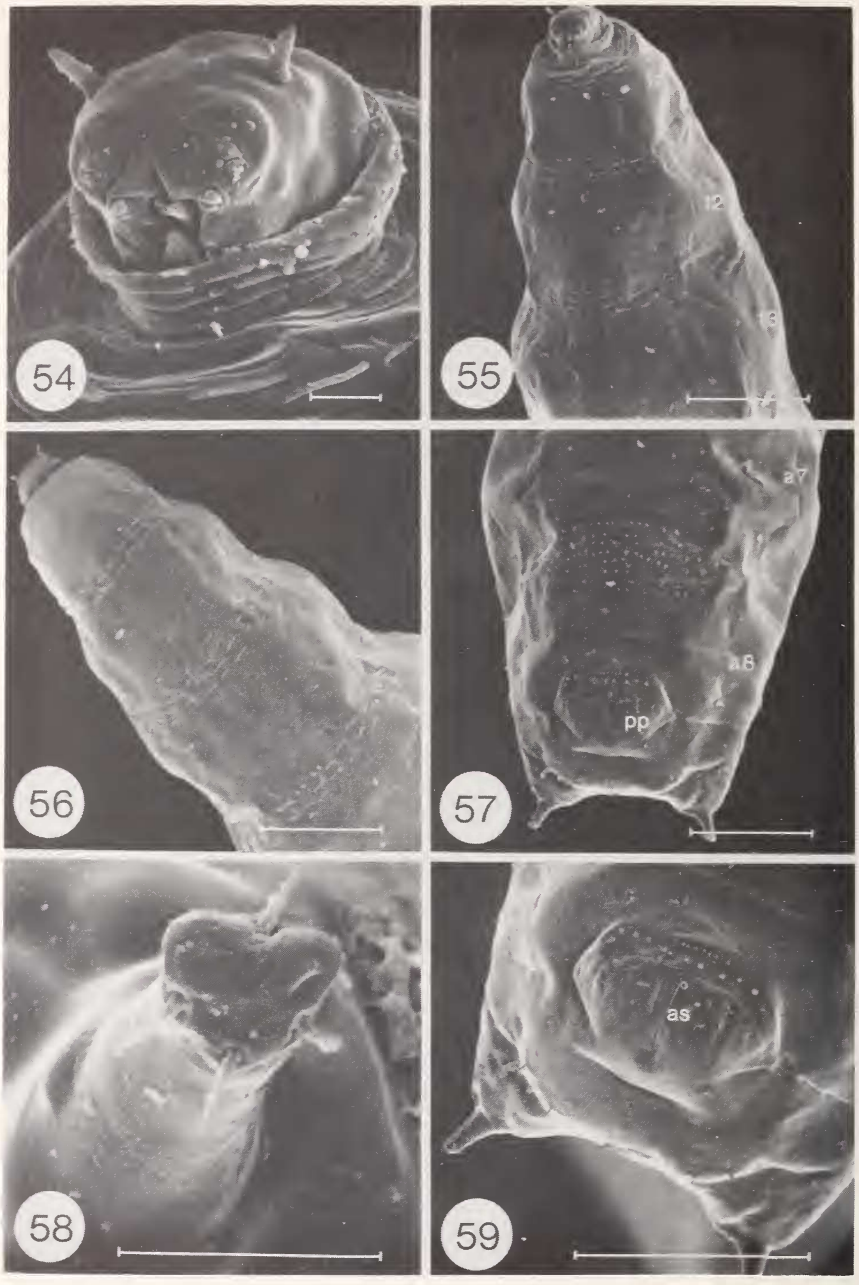
FIGS. 37-40. Male genitalia, cephalopharyngeal skeletons, and larval head (bars = 0.1 mm.). 37, male genitalia, *P. obscura,* paratype, Chiapas, a, left lateral, b, ventral. 38-40, cephalopharyngeal skeletons of larval *P. pruinosa,* Ontario: 38, first instar, left lateral; 39, second instar, left lateral; 40, third instar, a, left lateral, b, dorsal (tentoropharyngeal sclerite not included). 41, head of third-instar larva of *P. pruinosa,* Ontario, ventral. Abbreviations: an - antenna; dc - dorsal cornu of tentoropharyngeal sclerite; dp - discrete plate of maxillary palp; hs - hypopharyngeal sclerite; ip - indistinct plate of maxillary palp; ll - labial lobe; md - mandible; ns - needle-like sensillum; po - preoral margin; ps - papillate sensillum; rg - ridges of thoracic segment 1; se - sensilla; sp - spines; ts - tentoropharyngeal sclerite; vc - ventral cornu of tentoropharyngeal sclerite.



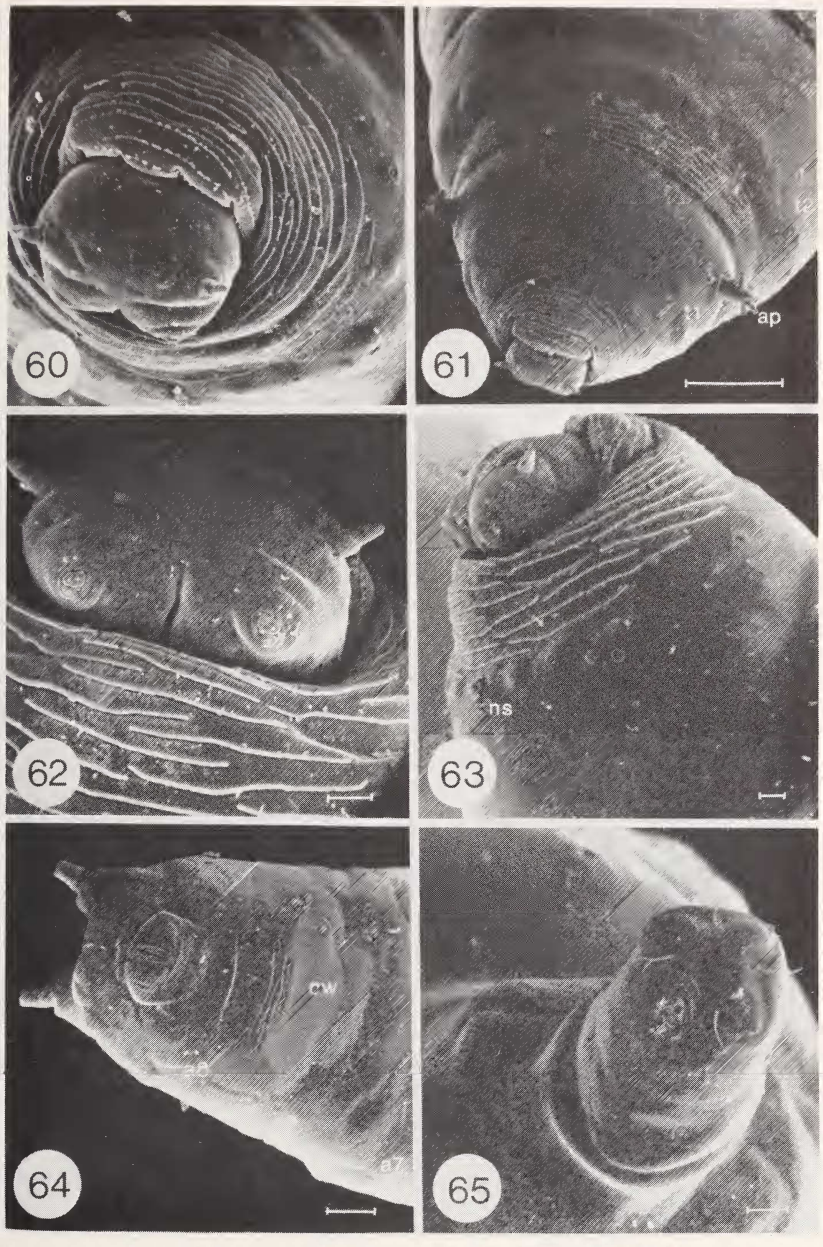
FIGS. 42-47. Adult male *Pseudodinia* (bars = 0.1 mm.). 42-43, *P. polita,* Maryland: 42, head, frontal; 43, genitalia, posterior, aedeagus everted. 44-47, *P. pruinosa,* Ontario: 44, head, frontal; 45, genitalia, anterolateral; 46, face and antennae, frontal; 47, abdomen, segment 3 to apex, lateral. Abbreviations: ae - aedeagus; ep - epandrium, lu - lunule; pm - paramere; sl - sublateral bare areas on tergites 3-5; T6 - tergite 6; TS7+8 - syntergosternite 7+8.



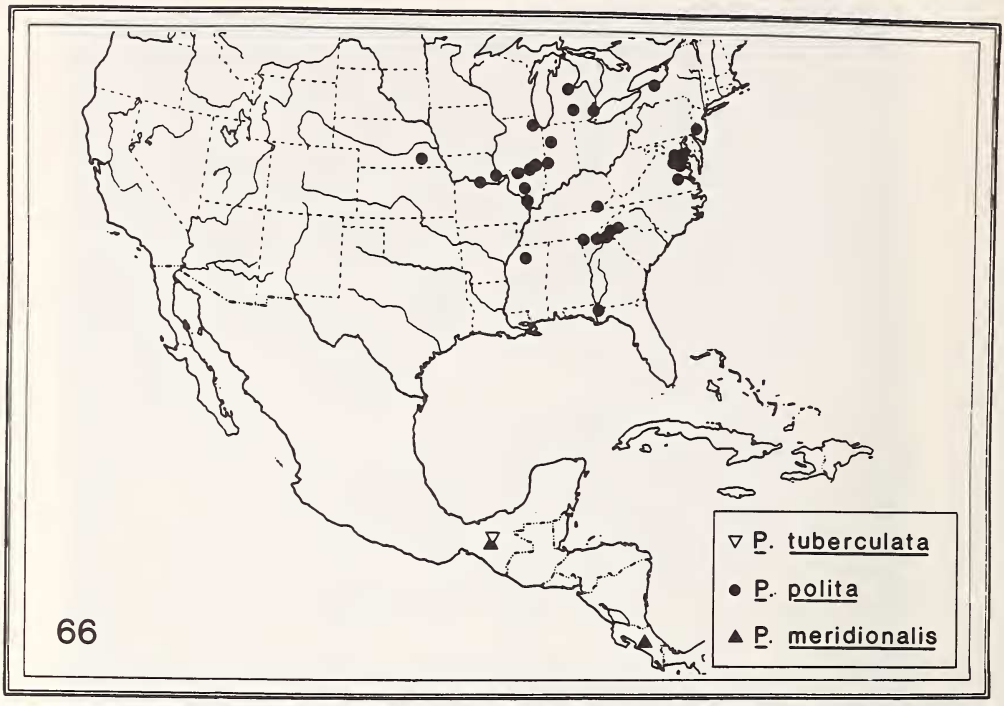
FIGS. 48-53. Eggs and larvae of *P. pruinosa,* Ontario. 48-51, eggs: 48, lateral (bar = 0.1 mm.); 49, microsculpture of chorion (bar * 0.01 mm.); 50, micropyle (bar = 0.01 mm.); 51, eclosion cap (bar = 0.1 mm.). 52-53, larvae: 52, second instar, posterior spiracle, apical (bar = 0.01 mm.); 53, third instar, habitus, ventral (bar * 1.0 mm.). Abbreviations: ec - eclosion cap end; es - ecdysial scar; ih - interstigmatal hair; mp - micropylar end; ss - spiracular slit.

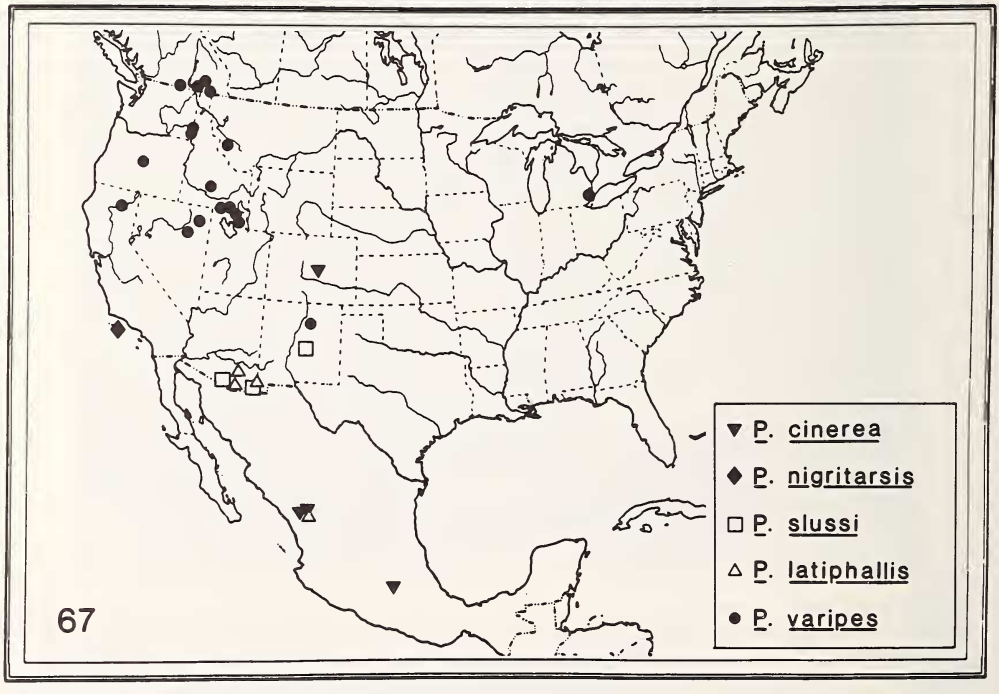


FIGS. 54-59. First-instar larva of *P. pruinosa,* Ontario. 54, head, ventral (bar = 0.01 mm.). 55, head and thorax, ventral (bar = 0.1 mm.). 56, head and thorax, dorsal (bar = 0.1 mm.). 57, abdominal segment 8 and apical portion of segment 7, ventral (bar = 0.1 mm.). 58, posterior spiracle, apical (bar = 0.01 mm.). 59, apical portion of abdominal segment 8, ventral (bar = 0.1 mm.). Abbreviations: as - anal slit; a7-8 - abdominal segments; pp - perianal pad; ps - papillate sensillum; tl-3 - thoracic segments.

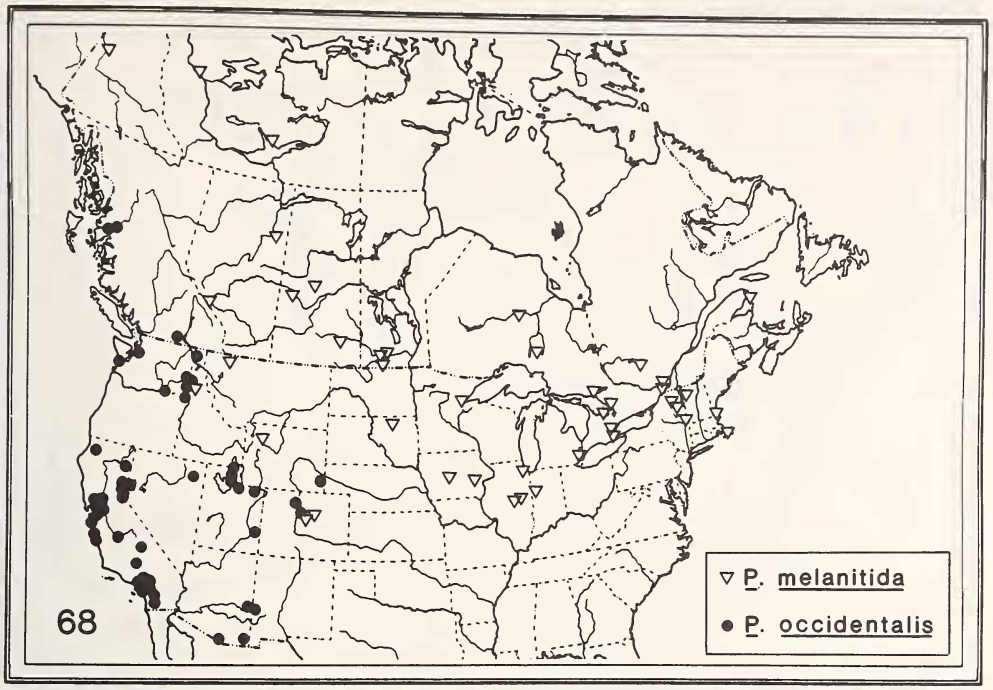


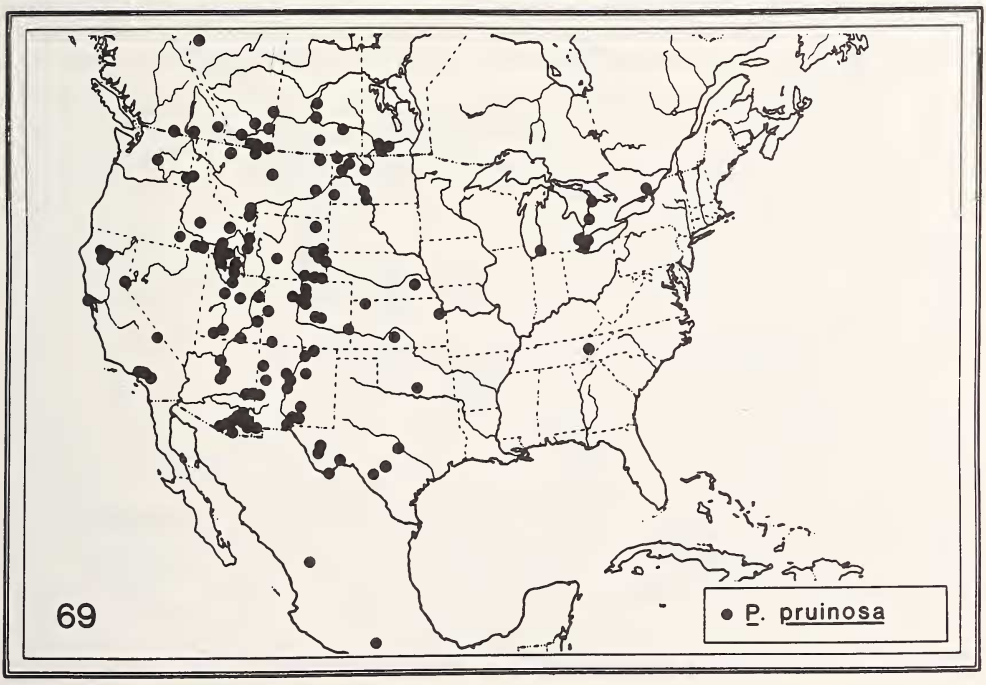
FIGS. 60-65. Third-instar larva of *P. pruinosa,* Ontario. 60, head and anterior portion of thoracic segment 1, anterior (bar = 0.01 mm.). 61, head and thoracic segments 1-2, anterodorsal (bar = 0.1 mm.). 62, head and anterior portion of thoracic segment 1, ventral (bar = 0.01 mm.). 63, head and thoracic segment 1, lateral (bar = 0.01 mm.). 64, abdominal segment 8, ventral (bar = 0.1 mm.). 65, posterior spiracle, apical (bar = 0.01 mm.). Abbreviations: ap - anterior spiracle; a7-8 - abdominal segments; cw - shagreened creeping welt; ns - needle-like sensilla; tl-2 - thoracic segments.



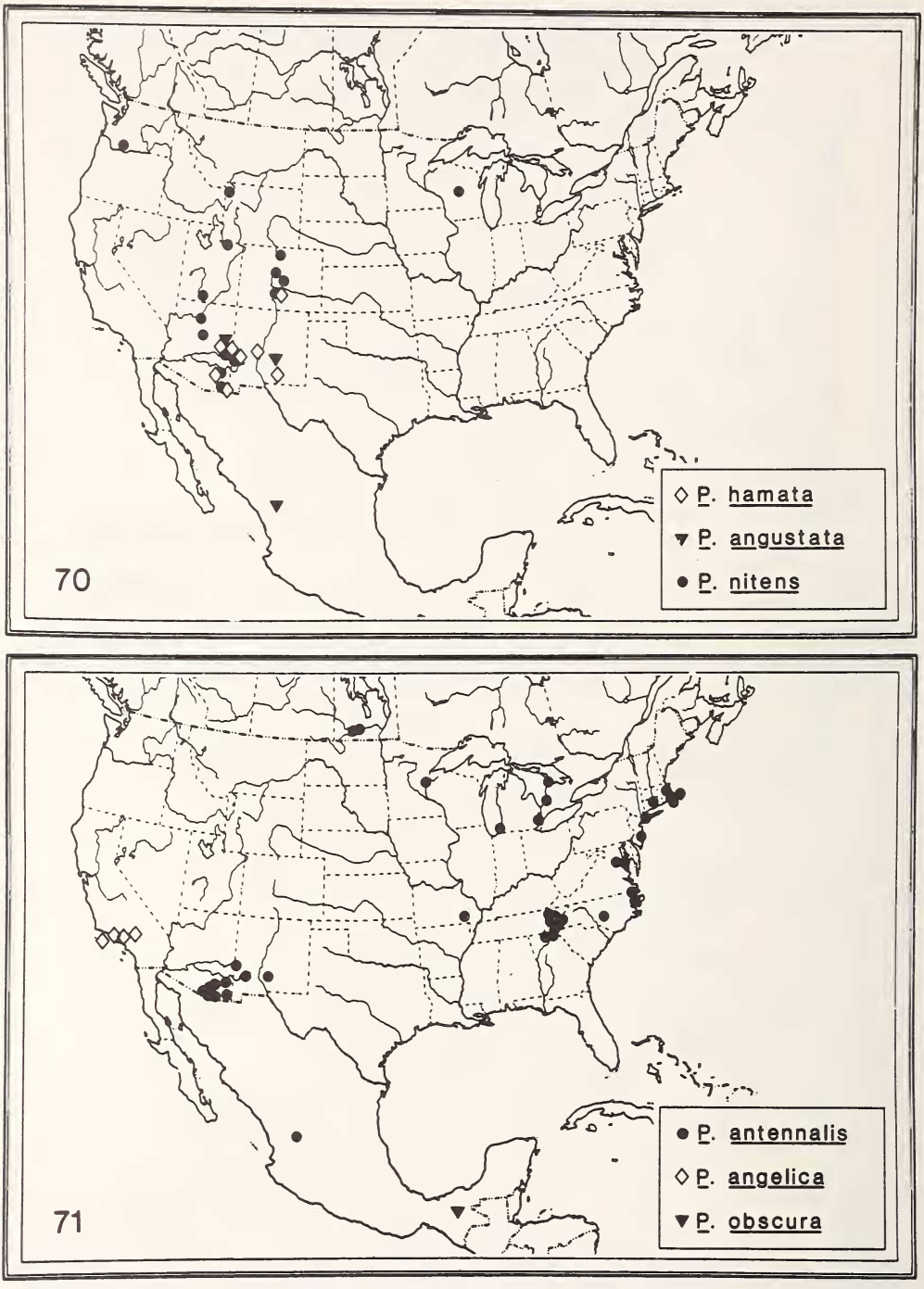


FIGS. 66-67. Geographical distributions. 66, *P. tuberculata, P. polita,* and *P. meridionalis.* 67, *P. cinerea, P. nigritarsis, P. slussi, P. latiphallis,* and *P. varipes.*

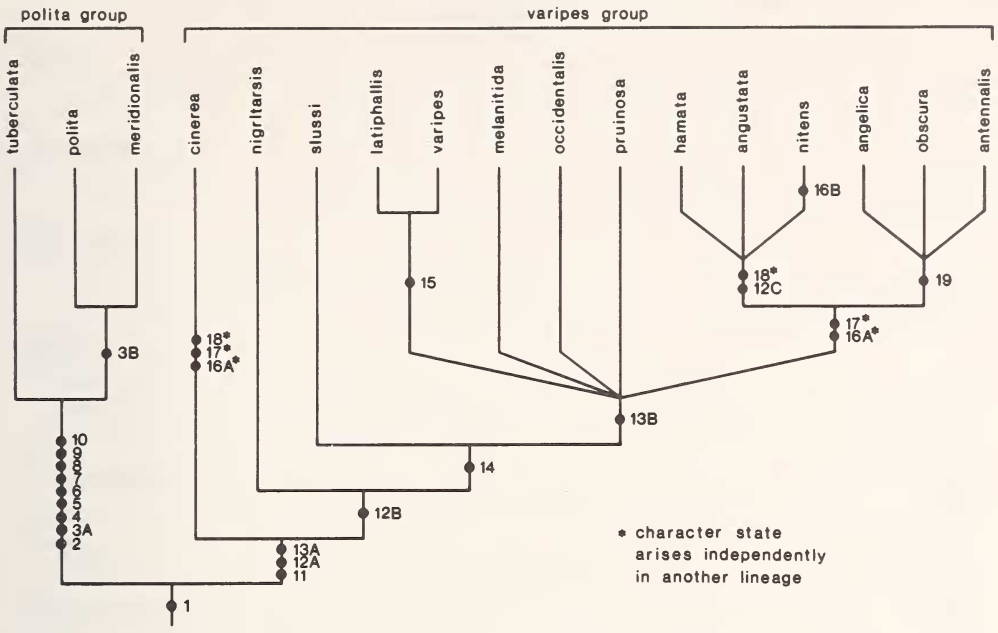




FIGS. 68-69. Geographical distributions. 68, *P. melanitida,* and *P. occidentalis.* 69, *P. pruinosa.*



FIGS. 70-71. Geographical distributions. 70, *P. hamata, P. angustata,* and *P. nitens.* 71, *P. antennalis, P. angelica,* and *P. obscura.*



72

FIGS. 72. Hypothesis of phylogenetic relationships among species of *Pseudodinia*. Apotypies. 1 - apex of paramere bevelled with one outstanding setula near anteroventral aspect (Figs. 13-17, 45). 2 - tibiae entirely yellow. 3A - lower orbital seta arising at 0.4 of frontal length (Fig. 1). 3B - lower orbital arising at 0.1-0.2 of frontal length (Figs. 2, 42). 4 - full series of well developed orbital setulae (Figs. 1-2, 42). 5 - lower margin of face projecting in lateral view (Figs. 1-2). 6 - anepisternal seta arising at 0.6-0.8 of anepisternal height (Fig. 4). 7 - width of wing cell r_2+_3 1.2-1.5X width of cell r_1 (Fig. 6). 8 - female tergite 6 complete, not divided medially (Fig. 11). 9 - ratio of height of compound eye to genal width relatively high at 6.4-10.0 (Figs. 1-2). 10 - frons with relatively weak, erect to slightly reclinate setulae sparsely scattered over most of its surface (Figs. 1-2, 42). 11 - epandrial condyle reduced, not hook-like (Figs. 15-37). 12A - epandrium broadly triangular, apices only slightly tapered (Fig. 15). 12B - epandrial apices moderately tapered (Figs. 16-29, 33-37, 45, 47). 12C - epandrial apices strongly tapered, nearly parallel-sided (Figs. 30-32). 13A - strap-like sclerite of male not extending dorsally, but running uninterruptedly from the left sensory setula of sternite 6, to that of sternite 7, and continuing posteriorly to encircle spiracle 7 (Fig. 9). 13B - strap-like sclerite interrupted, reduced, sometimes absent, at most consisting of a separate sclerite on each of sternites 6 and 7 near the left sensory setula (Fig. 10). 14 - male tergite 6 divided medially (Fig. 10). 15 - aedeagus strongly but gradually curved, in lateral view (Figs. 19-22). 16A - frons entirely pruinose. 16B - frons bare on at least anterior half (reversal to plesiotypic state; as in Fig. 44). 17 - sublateral bare areas usually reduced on male tergites, often leaving tergites entirely pruinose. 18 - length of male tergite 6 0.3-0.4X tergite 5. 19 - flagellomere 1 basally yellow to at least base of arista.